

SHORT WAVE AND TELEVISION

WORLD'S LARGEST SHORT WAVE CIRCULATION

JANUARY 38



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CANADA

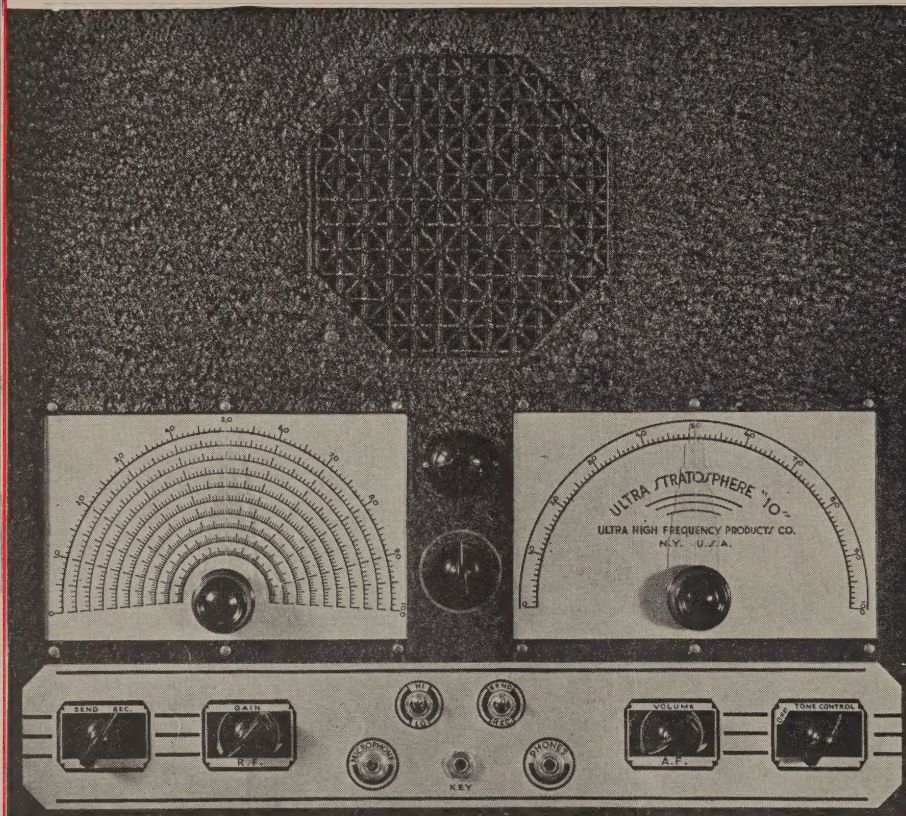
HUGO GERNSBACK

Editor

The Radio Experimenter's Magazine

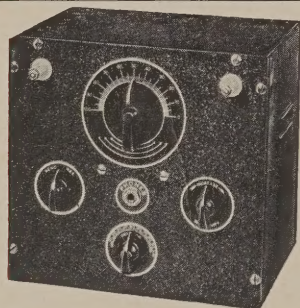
THE NEW 1938 ULTRA STRATOSPHERE "10"

2½ to 4000 METER TRANS-RECEIVER (RECEIVES 2½ to 4000 METERS) (TRANSMITS 2½ and 5 METERS)



Eager acceptance on the part of its purchasers singles out the Ultra Stratosphere "10" as the value of the year. The number of letters of appreciation was far greater than normally expected to prove that dollar for dollar the many purchasers of the Ultra Stratosphere "10" found it a wise investment. Long lists of verified stations received with this amazing unit will make even the most successful D.X. listener enthusiastic of its performance. Described in detail Page 295, October issue *Short Wave & Television*.

- *Ten tubes.
- 1—6K7 Regenerative Tuned R.F. Amplifier.
- 1—6J7 Regenerative Detector.
- 1—6J5G Super Regenerative Detector & Transmitting Osc.
- 2—6C5 P.P. 1st Audio stage.
- 2—25L6 P.P. Beam power output stage & modulators.
- 2—25Z6 Parallel Rectifiers.
- 1—6G5 Electronic tuning indicator & R meter.
- *Receives from 2½ to 4000 meters.
- *Transmits on 2½ & 5 meters.
- *8" Dynamic Speaker.
- *Calibrated R.F. Gain Control.
- *A.F. Gain Control.
- *Size—17½" x 19½"—16 gauge metal.
- *Tone control.
- *R.F. Resonator control.
- *Separate electrical bandspread.
- *Vernier planetary drives on tuning Cond.
- *Large 8" tuning dials.
- *May be used for I.C.W. and phone transmission and as a code practice oscillator. Only a key required.
- *Standby switch.
- *Automatic Phone jack.
- *Built-in A.C. & D.C. Power supply.



SENSATIONAL ULTRA A.C. + D.C. 2-TUBE TRANS-RECEIVERS 2½ to 4000 Meters TRULY A SENSATION

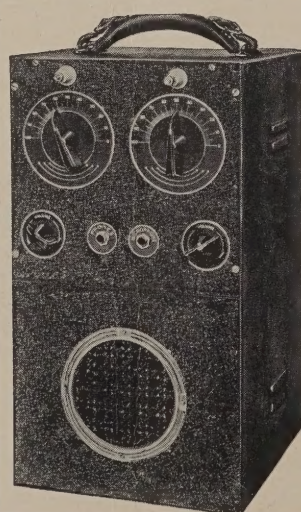
Uses the new 6J5G super triode tube which is the equivalent of acorn types

Never before was a unit of this type available at any price. This compact and self-contained unit will receive from 2½ to 4000 meters with a high degree of excellence. Will receive foreign stations, amateurs, police calls, broadcast, press, airplane and weather reports, time signals, and all ultra high frequency stations. As a 2½ and 5 meter transmitter surprising results will be obtained when calling friends from afar.

Complete kit unwired less tubes, coil cabinet microphone.....	\$7.15
Cabinet.....	.95
Matched set of tubes (12A7-6J5G).....	1.65
Wired and tested.....	2.00
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Set of 4 coils (15-200 meters).....	.95
Set of 5 coils (200 to 4000 meters).....	1.75
American SB Handmike.....	2.95
5" Magnetic Speaker.....	1.25

FEATURES

- ★ Transmits from 2½ to 5 meters
- ★ Receives from 2½ to 4000 meters (12 bands)
- ★ Separate electrical and mechanical bandspread
- ★ Loud speaker volume
- ★ Automatic super-regeneration from 2½ to 15 meters
- ★ House to house communication
- ★ Plate modulation
- ★ Built-in A.C. & D.C. power supply (any cycle)



ULTRA DUPLEX 6 TUBE MOBILE OR A.C. 2½ to 5 Meters (56 to 120 M.C.)

This unit uses six of the latest 6 volt tubes in a circuit which may be operated from a 6 volt automobile battery or by substituting power supplies from 110 volts A.C. Receiver uses 1-6J5G as a super-sensitive detector, 1-6J7 1st A.F. stage, 1-6F6 output stage. Transmitter consists of 1-6E6 oscillator, 1-6J7 speech amplifier, 1-6L6 class A modulator. Power output of transmitter is 10 watts 100% plate modulated. Separate antennas are used for peak efficiency of both units regardless of frequency settings. Changeover from 6 volt to A.C. operation is extremely simple. All that is necessary is to remove the built in genemotor and insert the A.C. power supply. Supplied complete with all coils including coil for 10 meter reception.

- 6J5G-6J7-6F6-6E6-6J7-6L6
- Built in 350 volt 150 mil filtered genemotor
- Built in dynamic speaker
- 10 watts power output
- 100% plate modulation
- Absolutely independent receiver and transmitter
- Negligible receiver radiation
- Automatic phone jack

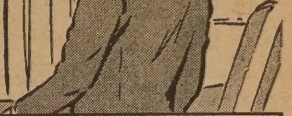
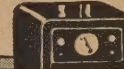
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FOOLING WITH RADIO---
OUR SET WON'T
WORK--- WILL
YOU FIX IT?

I'LL TRY, MARY,
I'LL TAKE IT
HOME TONIGHT



I CAN'T FIND OUT
WHAT'S WRONG---
GUESS I'LL MAKE A
FOOL OF
MYSELF
WITH MARY



HELLO, BILL--- GOT A
TOUGH ONE
TO FIX? LET ME
HELP YOU



HELLO JOE--- WHERE'VE
YOU BEEN LATELY---
AND WHERE DID YOU
LEARN
ANYTHING
ABOUT
RADIO?



I'VE BEEN STUDYING RADIO AT HOME, BILL,
WITH THE NATIONAL RADIO INSTITUTE. YOU
OUGHT TO TAKE THEIR COURSE, I'VE GOT
A GOOD RADIO JOB NOW. LET'S MAKE A
CIRCUIT DISTURBANCE TEST--- STARTING WITH
THE AUDIO OUTPUT STAGE
AND TESTING EVERY STAGE
RIGHT BACK TO THE
ANTENNA. LISTEN FOR
THE CLICKS WHEN I
TAP THE GRID LEADS



SAY--- WHERE
DID YOU LEARN
THAT TEST? IT'S
A GOOD ONE



HERE'S THE TROUBLE, BILL, IN THE
FIRST I.F. AMPLIFICATION STAGE, I
LEARNED THAT TEST EVEN BEFORE
I STARTED TAKING THE COURSE,
BILL. IT'S DESCRIBED IN A
FREE LESSON WHICH THE
NATIONAL RADIO INSTITUTE
SENDS YOU WHEN
YOU MAIL A
COUPON FROM
ONE OF THEIR ADS



I'VE SEEN THEIR ADS
BUT I NEVER THOUGHT I
COULD LEARN RADIO AT
HOME--- I'LL
MAIL THEIR
COUPON RIGHT
AWAY



I'M CONVINCED NOW THAT THIS
COURSE IS PRACTICAL AND
COMPLETE. I'LL ENROLL NOW

AND THEN I CAN MAKE
REAL MONEY SERVICING
RADIO SETS

OR INSTALL AND SERVICE
LOUD SPEAKER SYSTEMS

OR GET A JOB
WITH A RADIO
BROADCASTING OR
TRANSMITTING
STATION



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ELECTRONIC CONTROLS---
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or training.

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a Week

Radio broadcasting stations employ engineers,
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\$5,000 a year. Spare time Radio set servicing
pays as much as \$200 to \$500 a year. Full time
Radio servicing jobs pay as much
as \$30, \$50, \$75 a week. Many Radio Ex-
perts operate their own full time or part time
Radio sales and service businesses. Radio
manufacturers and jobbers employ testers, in-
spectors, foremen, engineers, servicemen, pay-
ing up to \$6,000 a year. Radio operators on
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Automobile, police, aviation, commercial
Radio, and loud speaker systems offer good
opportunities now and for the future. Tele-
vision promises many good jobs soon. Men
I trained have good jobs in these branches
of Radio.

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While Learning

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build circuits illustrating important Radio

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man in America.



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GOOD AS THE DAY
I BOUGHT IT.

THANKS! IT CERTAINLY IS
EASY TO LEARN RADIO THE
N.R.I. WAY. I STARTED ONLY
A FEW MONTHS AGO, AND I'M
ALREADY MAKING GOOD MONEY.



THIS SPARE TIME
WORK IS GREAT
FUN AND
PRETTY SOON
I'LL BE READY
FOR A FULL
TIME JOB

OH BILL--- I'M SO
GLAD I ASKED YOU
TO FIX OUR RADIO.
IT GOT YOU STARTED
THINKING ABOUT
RADIO AS A CAREER,
AND NOW YOU'RE
GOING AHEAD
SO FAST

OUR WORRIES ARE OVER.
I'M MAKING GOOD MONEY
NOW, AND THERE'S A
BIG FUTURE AHEAD
FOR US IN
RADIO



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The Next issue comes out
January 1st

HUGO GERNSBACK, Editor
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STAR AUTHORS THIS MONTH:

Gerald S. Morris

C. W. Palmer

G. W. Shuart, W2AMN

Raymond P. Adams

Jim Kirk, W6DEG

Joe Miller

IN THE FEBRUARY ISSUE:

3-Tube Exciter which can be used as a simple transmitter. George W. Shuart, W2AMN.

Ultra High Frequency Converter, 4 to 11 meters, for use with any all-wave receiver.

How to build a simple VT. Peak Volt-meter Unit.

A simple Induction Phone System—how to build it. G. F. Huether, W2IHO.

How To Become a Television Engineer, H. W. Secor

Building A Lie Detector



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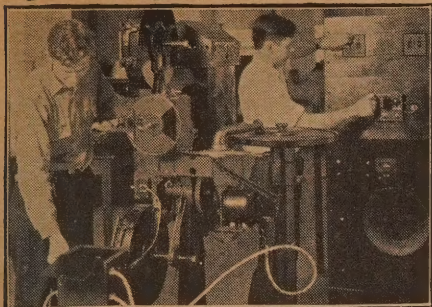
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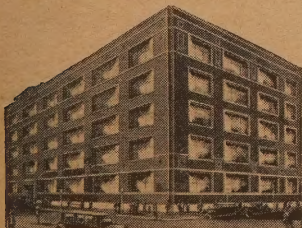
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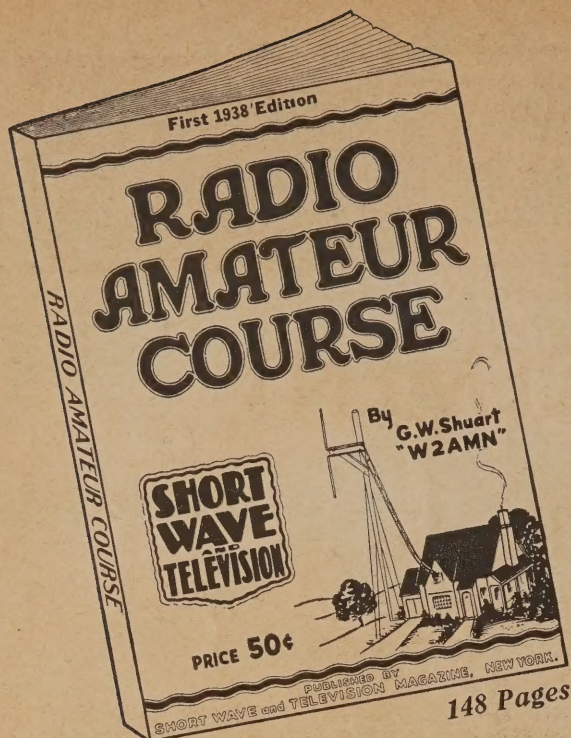
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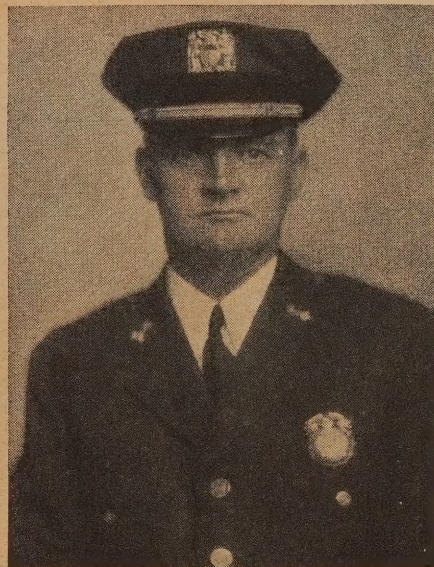
By GERALD S. MORRIS

SUPERINTENDENT TELEGRAPH BUREAU, NEW YORK CITY POLICE DEPARTMENT

● THE law enforcement agencies of the United States of America owe a debt to radio. While the science and profession of law enforcement is as old as civilization, until but a few short years ago police departments throughout the world had suffered from one serious handicap. This handicap was the difficulty that precinct or city headquarters had in communicating with such patrolmen as might be nearest the scene of a reported crime.

Back in the earliest days of history, men were dispatched from the headquarters to the scene of the crime afoot or on horseback. At a somewhat later date signal trumpets by day or signal fires by night were used as signals. More recently and within the memory of everyone, the means of signalling to the patrolman on duty was a flashing light upon the stanchion which supported the police call box. This, you will see, was a vast improvement. However, it was necessary that the patrolman see this light before he came to the box, perhaps several blocks, telephoned headquarters, was connected to the right supervising officer and then received his instructions. These, perhaps, sent him back to where he came from or near it. During the time all this procedure was occurring it was sometimes possible for the criminal to make his escape.

With the advent of short-wave police radio all this was changed. Headquarters was in instant direct communication with every mobile unit throughout the area under its jurisdiction. Perhaps a clearer idea of just how efficiently radio serves law and order can be had by a brief description of what transpires when a situation arises where a citizen wants a policeman, in a city which has a police radio system. A civilian merely goes to his telephone and says: "I want a policeman." His call is immediately connected to the switchboard at headquarters and through that directly to the radio room where it is taken by a dispatcher. In our headquarters this dispatcher sits at a large horse-shoe shaped table, beneath the glass top of which is a map of the five boroughs of Greater New York City, laid out in police precincts and detective divisions. On top of the glass are numbered discs, each of which represents a police car or detective cruiser. The dispatcher receiving the call writes the name and address of the complainant and the nature of his complaint on a small slip of paper. At the same time he notices which cars and cruisers are at liberty in that vicinity. He notes their numbers likewise



Gerald S. Morris, Chief Officer of the Telegraph Bureau, in charge of all electrical systems of communication of the New York Police Department.

on the paper, which he immediately hands to another dispatcher seated at the microphone.

While it takes many words to describe this simple procedure, it is actually accomplished in much less than a half a minute. The dispatcher at the microphone throws a control switch which puts one of New York City's three police radio stations on the air. He uses whichever station is nearest the location where the complaint originated. An audio oscillator note is then sounded to attract the attention of the patrolmen and detectives in their cars, and after a few seconds of this the address of the complainant and a code signal disclosing the nature of the complaint is transmitted, together with the numbers of the cars which are specifically assigned to respond to the alarm.

It is also a police regulation that any cruisers or patrol cars within five blocks of the address given shall likewise respond. All cars assigned to patrol are required to tele-

phone their reports into headquarters as soon as possible after they have made their investigation or arrest.

Despite the crowded conditions of the city streets, the average time which elapses between the receipt of the citizen's complaint and the report of the cars assigned to the alarm is less than five minutes. This speed has resulted in a decrease in most major crimes as well as many minor ones such as the ringing of false fire alarms. The latter, though considered minor, is quite important as a great number of firemen sustain serious injury in responding to false alarms. For that reason a police car is now required to respond to every alarm of fire throughout the city.

In addition to the reduction of crimes per capita, there has been an increase in the percentage of arrests per crime committed.

Arrests made and property recovered by members of the police force assigned to Radio Motor Patrol cars:

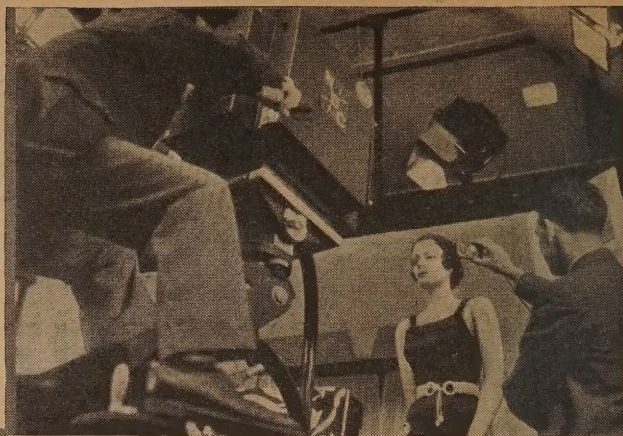
YEAR	ARRESTS	PROPERTY RECOVERED
1932	1029	\$ 258,691.63
1933	3330	\$1,082,522.00
1934	4641	\$1,482,750.00
1935	4946	\$1,308,700.00
1936	4932	\$1,162,539.00

As will be seen from the foregoing, a greater amount of property is likewise being daily restored to the citizens from whom (Continued on page 505)

Thirteenth of a Series of "Guest" Editorials



→
Right—Here you see "Miss Patience" reporting for work before the Iconoscope camera in NBC's television studio. The man at the right is not holding a watch to the lady's ear. He's using a light meter to measure the amount of illumination on her imperturbable face.



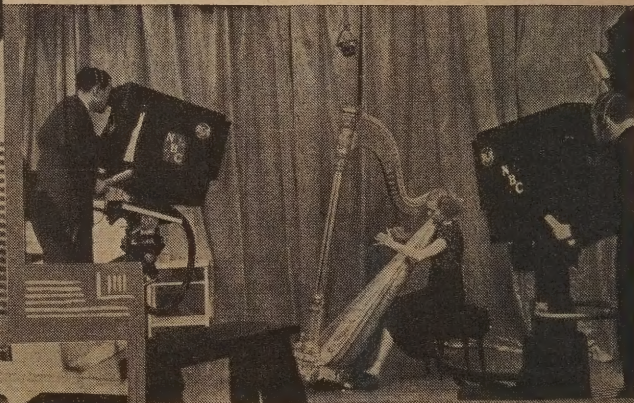
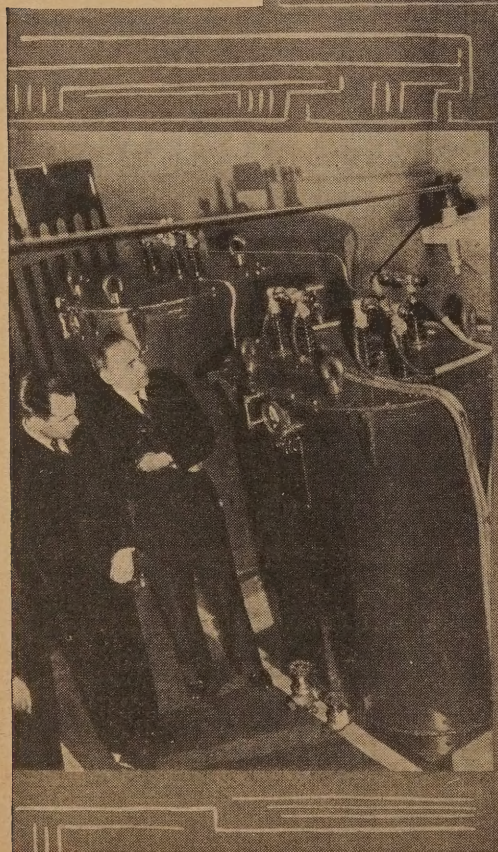
←
Left—This isn't an oil well derrick! It's the Chrysler Building! It's an exact electrical reproduction of the top of the New York skyscraper where the CBS new television transmitter is to be located.

Short Wave

→
Right—Tubes for Television. Gilbert Seldes (left), television program director, and Dr. Peter Goldmark, chief television engineer, inspect the largest and smallest water-cooled tubes used in the new CBS television transmitter. The large power tube has 15,000 watts peak output and is three feet long.



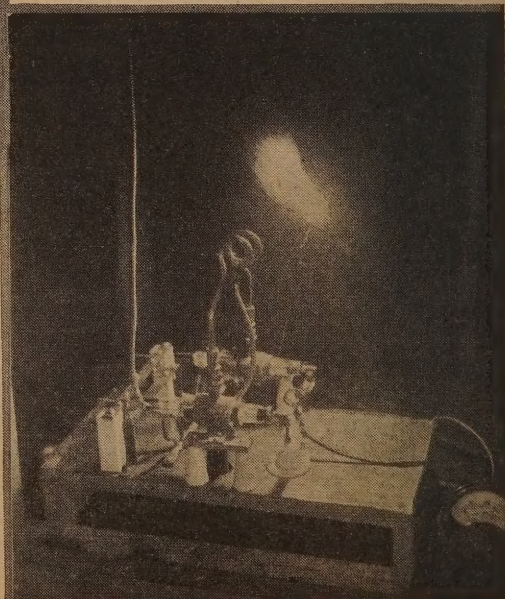
Below—In the new CBS television transmitter, this transformer, one of ten, weighs 5215 pounds and is cooled by 212 pounds of oil. 120 gallons of water per minute are needed to cool other parts of the transmitter, a complete air conditioning unit cools the water.



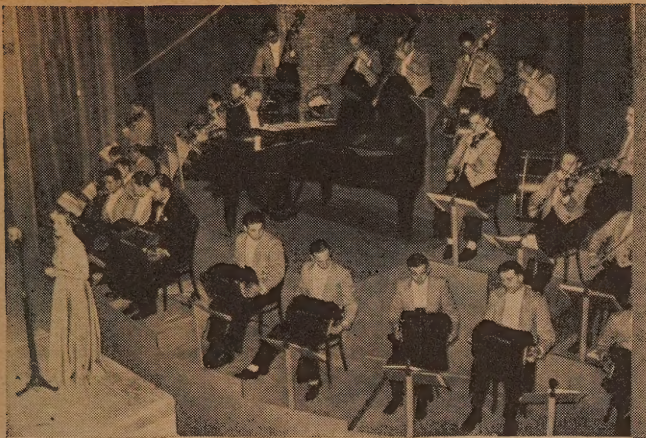
↑
Above—Margaret Brill, harpist, photographed in the television studio at Radio City during demonstration by NBC and RCA of the first practical larger-screen television. An image approximately three-by-four feet was shown. Eight complete scene shifts and more than 40 different camera positions were involved.



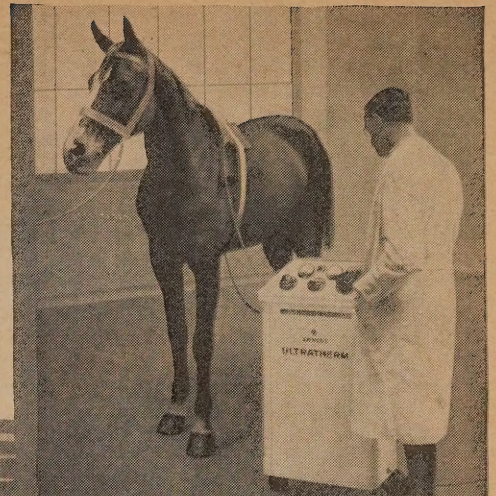
↑
Above—One of the CBS television experts is here seen trying out one of the image pick-up cameras, which is provided with a crane and seat so that the operator can swing around while televising the players in the studio. Frequently two cameras are used, one for close-ups and one for long shots.



→
Right—A high-frequency wave in the RCA Labs., when a power of 1.5 kilowatts at a wavelength of 3.3 meters is used in certain oscillator set-ups. The tubes used were water-cooled units connected in a push-pull circuit.



Right—Even the animals are now being treated by S-W Diathermy as this picture testifies. The apparatus in use is of German design. In view of the excellent results now obtained in treating human ills by short waves, why not treat ailing animals with them?



Left—This snappy looking musical ensemble is Ciriaco Ortiz's Tango Band, which is heard regularly over the famous Buenos Aires stations LRX and LRU.

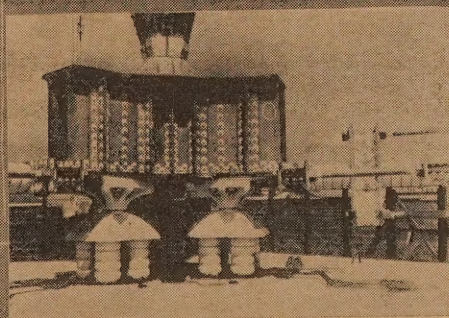
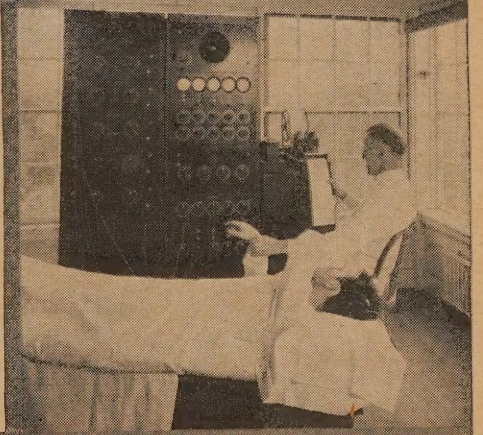
Pictorial



Right—Brain Waves! Thanks to the research of the Electro-Medical Laboratory Inc., of Holliston, Mass., science is now enabled to record "brain-waves" of human beings. This apparatus uses cathode ray tubes.

Photo courtesy of Allen DuMont Labs.

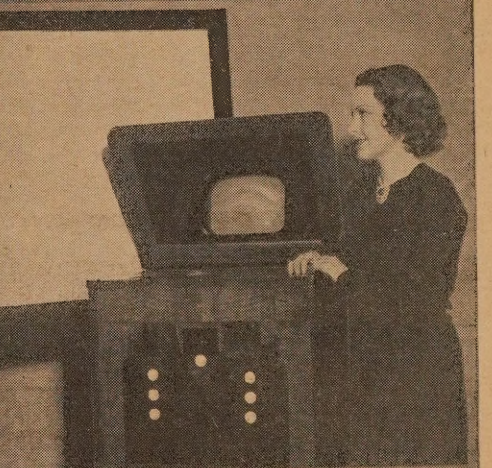
← These two photos show the new RCA large image television apparatus. Betty Goodwin, NBC television announcer, is seen in both pictures. The left one shows the projector, while below we see the small image receiver compared with the new 3 x 4 ft. screen. ↓



Above—Short Waves in Japan. This photo shows how the aerial systems have been specially designed to be earthquake-proof at the Nagoya station.

Right—Scene in a short-wave broadcasting studio in Tokyo—a girls' orchestra playing popular tunes on pre-modern instruments as a novelty.

Left—Miss Memechiyo, hostess-announcer of the Japanese radio broadcasting center in Tokyo, at the microphone. Possibly many listeners have heard her pleasant voice.





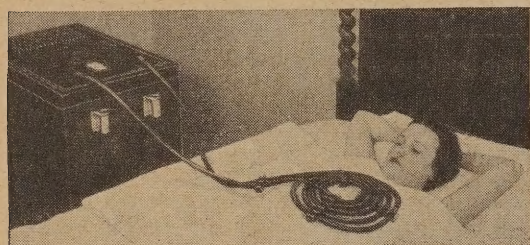
The cover picture here reproduced, shows how the high-frequency field is applied to the head.

Human Ills Cured

By New Short Wave Technique

This month's cover

● THE accompanying diagrams show new methods of applying short-waves for the alleviation of human ills. The photo immediately above, which corresponds to our cover, illustrates how certain ailments of the head may be treated by placing the high-frequency electrodes on either side of the head. Many physicians who have experimented with short-wave diathermy, have achieved some very interesting and important results. Several interviews the editors have had with a number of electro-theraputists have shown great enthusiasm for this new method of treating different types of ailments which would not yield to treatment by older methods. A considerable amount of experimentation is being carried on in order to determine just which frequencies are best suited for treating different ailments. Two different methods are illustrated in the accompanying photos for



Here is a different technique in applying the high frequency field, the currents circulating in the coil producing a field which passes through the body.

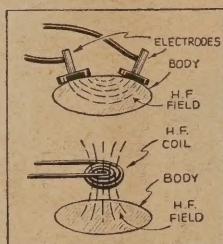
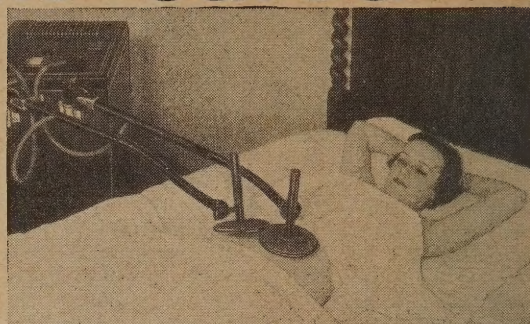


Diagram shows how the H.F. field acts on a body placed in proximity to the electrodes.



New method of treating abdominal ailments with short-waves—the high frequency field extends from one electrode to the other, and induces a vibratory action in that part of the body subjected to this field.

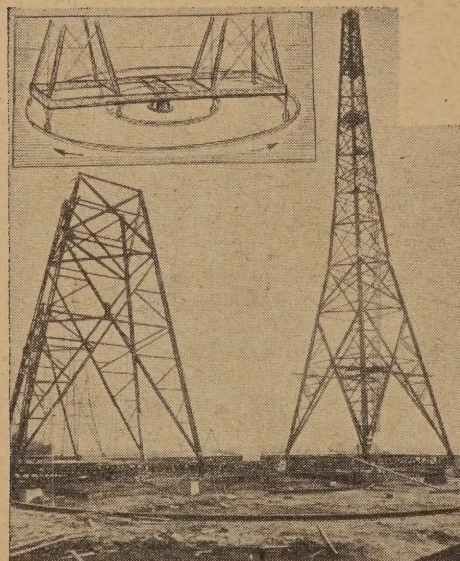
applying the high frequency field to a patient. The first employs two condenser or other type electrodes which are placed, for example, side by side over the abdomen. Here the high-frequency electrical field produced between the electrodes causes induced currents to be set up in the vicinity of the electrodes.

A heating effect may or may not be noticeable to the patient, and as pointed out in a recent article in this magazine, some of the experts now believe that the benefits derived from treatments by short-wave diathermy, are not due to the heat induced, but rather to the high frequency vibration set up in the cells constituting the nerve and muscle structure under treatment.

One of the photos, that at the extreme left, shows another method of applying the high frequency or short-wave magnetic field to a patient; here the H.F.

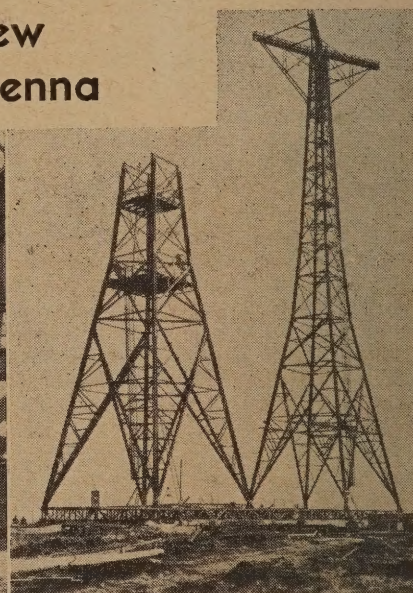
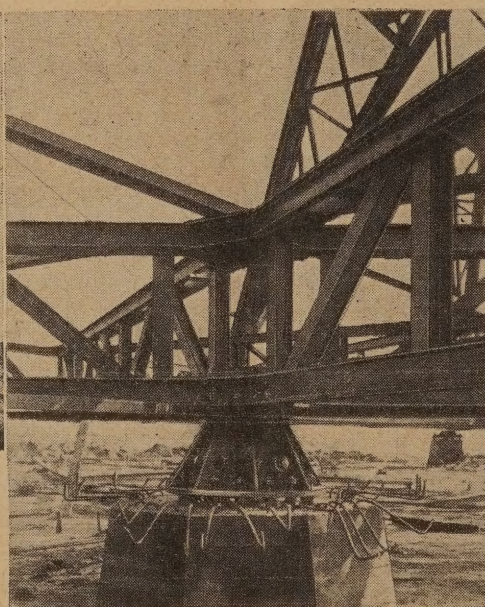
(Continued on page 505)

PCJ, Holland's, New Revolving Beam Antenna



Above—This photo shows the masts partly completed, and provides a very good view of the two rails; the outer one ready, the inner one half completed.

Center—This print very clearly shows the iron pivot, partly sunk into a concrete foundation. Around this pivot the old system of undercarriers, united by a steel bridge, will rotate.



This photo shows the two aerial masts in course of construction. The remarkable construction on top of the right one is part of the "beam" installation. This idea was first suggested by an American engineer.

● STATION PCJ, the well-known Holland short-wave broadcaster, has recently raised its power to 60 kw. making it one of the most powerful, if not the strongest short-wave station in the world, and not only this, but PCJ is sporting a new revolving beam antenna. The accompanying photos show

the steel structure which supports the new beam antenna and as the diagram shows, the whole antenna can be rotated on circular tracks by remote control from the operator's station.

The aerial masts are built on heavy steel carriers mounted on wheels. The wheels of

these carriers run on a circular track, which differs from the average railway track only in the much heavier construction of the rails and the greater distance between them. These steel carriers are united by a bridge, turning around its center (which is also the center

(Continued on page 505)



When 2RO—ROME—Goes On the Air

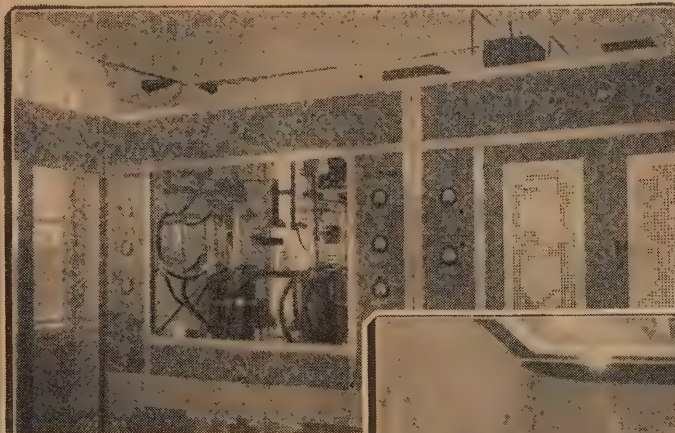
A number of interesting photos of artists, as well as of the studios and aerial system of station 2RO, Rome, Italy, familiar to all short-wave listeners.

Alva Simonetti, soprano, featured artist on American Hour—2RO, Rome.

Enzo Aita, tenor, featured artist on American Hour—2RO, Rome.



Right—25 meter final amplifier (pre-final and modulator on right)



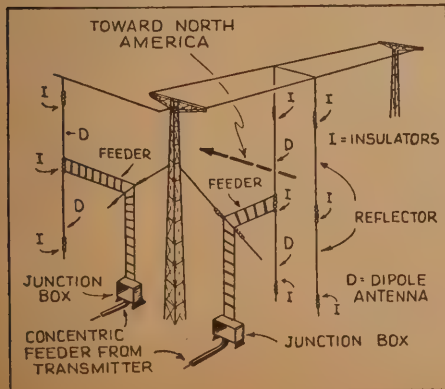
← The tower in foreground supports directional antenna to North America. 25 and 31 meter-dipoles are hung from left-hand tower.

→ Grand orchestra in studio "B," second largest in Rome. It is used mainly for operas, symphony and choral concerts.



● ONE of the old standbys for short-wave listeners is 2RO. This station has been broadcasting for a good many years and has always been well heard in this country, either

Below—Masts support directional arrays. Each directional array consists of a vertical dipole with its associated reflectors.



on 11.81 or 9.635 mc.

During our afternoon hours the station generally relays the programs of various Italian long-wave stations. Interspersed with these programs, however, are numerous news or propaganda broadcasts in a variety of languages. Special programs for North America are broadcast in English from 6:15-7:45 p.m. on Mondays, Wednesdays and Fridays. Programs for South America go out from 6:20 to 7:45 p.m. on Tuesdays, Thursdays and Saturdays. An English news bulletin is broadcast daily except Sunday from 6-6:15 p.m. (E.S.T.). All of these broadcasts are on 9.635 mc. By far the greater part of the programs broadcast are opera presentations in which the Italians excel.

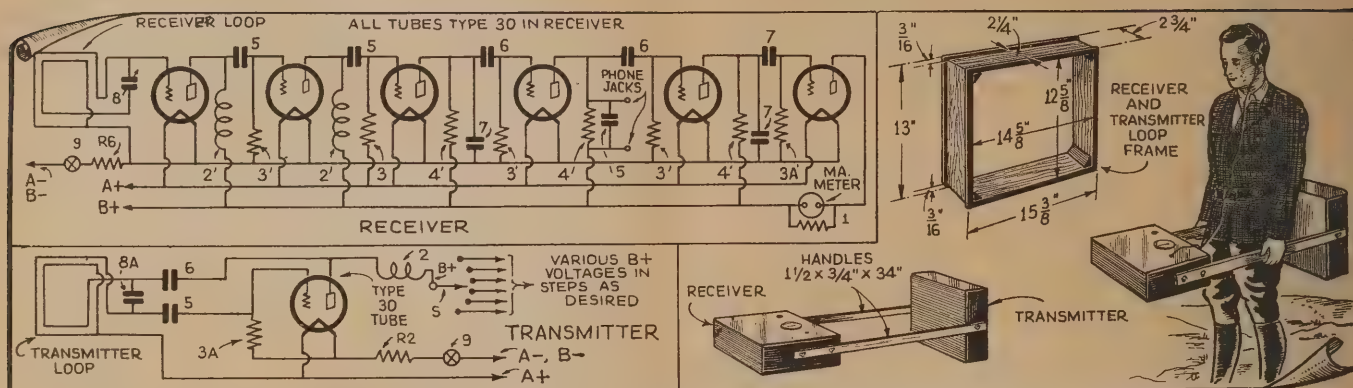
One of the outstanding features of 2RO is its women announcers, whose voices are familiar the world over. The regular announcer, or should we say *announcerss*, of the American Hour is Lisa Sergio, who is in the United States at the present time studying American broadcasting practice. She has

several new 100 kw. transmitters and an entirely new aerial system are in process of construction. When these are completed, the Italian station will probably be the most powerful in the world.

Below—Rome studios of the Italian Broadcasting System (E.I.A.R.).



New Experiments With Radio Apparatus



Another electrical use for radio parts, and a valuable one, is illustrated above. It comprises a simple pipe and ore locator.

Ore Locator

● A TREMENDOUS field for experimenters today is that of locating ore veins in the ground, as well as buried pipes, by an adaptation of some radio device. One idea is shown in the diagram herewith, using 2 volt tubes such as the 30 type (or the new RK-42, 1 1/2 V. type), a single tube acting as the transmitter and six tubes being used in the receiver. The transmitting and receiving aerials are wound in the form of loops and the size of the loop frames are given in the drawing. The details of the parts appear in the following list.

Key No.

"1" One milliammeter (d.c.) with sufficient shunt

- "2" R.F. Chokes. 1500 turns each, of No. 34 copper wire, enamel covered. Random wound or "duo-lateral."
- "3" One megohm resistors.
- "3A" Three megohm resistor.
- "4" One-tenth megohm resistor.
- "5" Fixed condensers; capacity, .0005 mf.
- "6" Fixed condensers; capacity, .006 mf.
- "7" Fixed condensers; capacity, .001 mf.
- "8" Adjuster, trimmer type condenser, capacity, 0 to .0005 mf.
- "8A" Fixed condenser; capacity, .00025 mf.
- "9" Switches, push-pull type preferred.
- "10" Tip-jacks for phone connection. Phone jack can be used.
- "S" Four point, single gang, selector switch.
- "R1" 10 ohm filament resistor.
- "R2" 5 ohms.
- "R4" 2.5 ohms.
- "R6" 2 ohms. (Use R1 for one type 30 tube. R2 for one type 31 tube. R4 for four type 30

tubes. R5 for five type 30 tubes. These resistors can be made up of 30 Nichrome wire, wound on a fibre strip. This wire has approximately one ohm resistance for each 1.6 inch of length. The length to use, therefore, for the various resistors is: R1, 16 inches. R2, 8 inches. R4, four inches. R5, 3 1/2 inches.) The loop frames are wound with 80 turns No. 33 D.C.C. copper wire center-tapped.

In adjusting the apparatus, the transmitter and receiver fields will cancel at approximately right-angles to each other and no signals will be picked up by the receiver with this setting. The presence of metal in the transmitting field will disturb the balance and a note will be heard in the phones, and the tube voltmeter will register the strength of the disturbance.

Motor Speed Control With Variable Resistors

● THE problem which many electrical and radio experimenters are frequently confronted with is that of controlling or varying the speed of a small motor. The diagram shows two different ways in which this may be done, the first hook-up showing the con-

nection of a variable resistance or rheostat in series with the motor. The second hook-up shown is a very useful one, especially where there is a varying load on the motor; here the variable resistance (and in some cases a fixed resistor also) is connected across the armature of the motor.

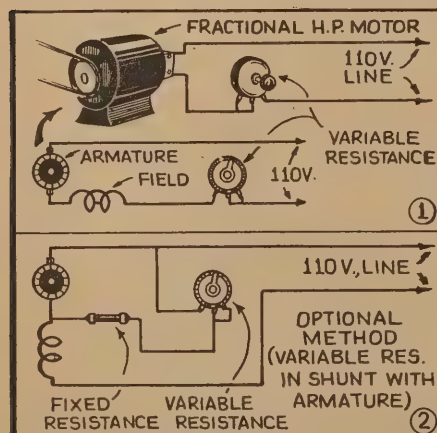
A third variation might involve both methods, the two variable resistors being controlled by one shaft and a single knob. The connection shown in the diagram is for a series-wound motor, one of the most common types met with in small motors. The rheostats especially adapted to this work are available on the market and they may be had in sizes of from 25 watts up to 1,000 watts. For controlling very small motors, a potentiometer of fairly low resistance may be used, but those wound with fine wire will usually heat up too much to be of practical value.

Use for Old Power Transformers

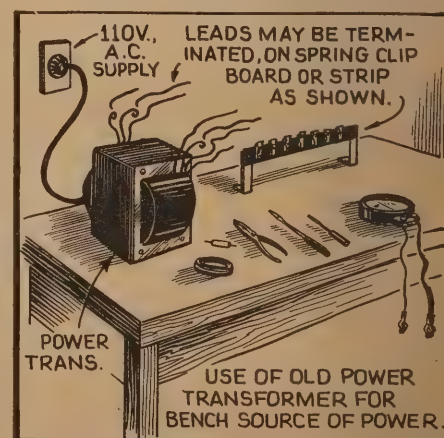
● OLD power transformers will find a very useful rôle on the test bench, as a source of supply for different testing voltages. It is a good idea to connect the various lead wires from the transformers to a terminal strip, made from a piece of bakelite as shown in the sketch, the different binding posts or

spring grip posts being labeled with the different voltages. A surprising number of experimenters and set repair men do not have a source of plate voltage supply for tests in the shop.

In some cases one of the high voltage windings may be burned out; in such cases a couple of these transformers may be tested and the good secondaries used in series.



Two different ways in which to use variable resistors for controlling the speed of small motors are shown above.



Old power transformers serve very nicely as a source of different testing voltages for the work bench.

● **SHORT WAVE & TELEVISION**, "the radio experimenter's magazine", has—ever since its inception in 1930—brought you all worth-while radio experiments, particularly experiments as far as set-building, both receiving and transmitting, is concerned. However, radio experimenting reaches much further than this. It is possible today for radio experimenters to perform all sorts of experiments, which—while not strictly radio—are allied with it in many ways.

Today the experimenter has at his command many radio instrumentalities which the electrical experimenter did not have years ago. Consequently it is now possible to per-

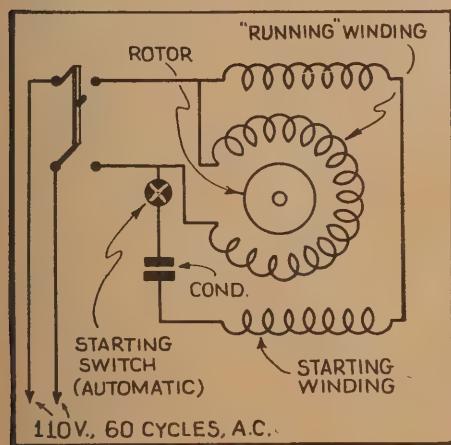
form many experiments using radio parts of one type or another.

This month therefore, we inaugurate this new department, and we are certain that you will derive great benefit from it. A number of experiments are shown in these pages, and the department, if it meets with your approval, will continue from month to month.

Each month we will award 2 prizes, the first of \$10, the second \$5.00, for the best **NON-RADIO** uses of ordinary radio parts and radio instrumentalities. Hundreds of different ideas may be adapted for this contest; the editors will be grateful for your ideas.

Condensers for Starting A.C. Motors

● **SMALL** A.C. motors are frequently started by using a fairly large condenser in series with the starting winding, as shown in the accompanying diagram. Electrolytic condensers designed for intermittent A.C. duty may be used in connection with the starting of *split-phase* type motors. This type of condenser is also known as a starting condenser and electrolytic condensers, especially suited to this purpose or made with *two formed foils*, and are frequently referred to as *double formed* condensers, since both plates instead of one are formed. As the diagram shows, a starting switch, usually



How a condenser may be used to start a split-phase motor. An automatic switch is usually employed to open the condenser circuit as soon as the motor has attained normal speed.

built as part of the motor and automatic in action, is connected in series with the starting condenser and starting winding.

The condenser should only be connected for a few moments in the circuit while the motor is accelerating and as soon as normal speed has been reached, the automatic switch should open the condenser circuit. For experimental work the switch may be manually operated.

The capacity of the condenser will vary with the size of the motor and a little experimenting with various capacities may be necessary, additional condensers being connected in parallel until the proper value has been found.

Hearing Aid for the Deaf

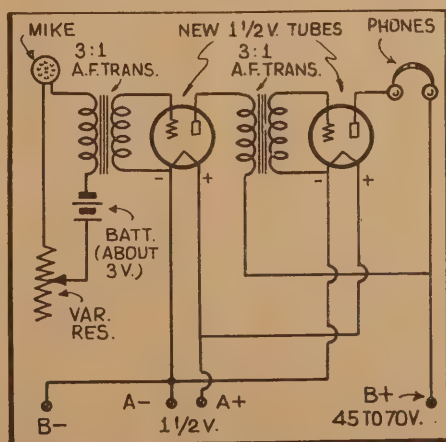
● A **ONE** or two stage vacuum tube amplifier, together with a fairly sensitive microphone and a pair of headphones, make a very good amplifier for use as a hearing aid

for deaf persons. Many other uses for this type of apparatus may be found, notably for picking up sounds in a room, such as in detective cases, etc.

Aside from the amplification obtained by the use of the vacuum tubes and transformers, the sensitivity of the device is governed by the quality of the microphone and the sensitivity of the headphones. If the device is to be used for detective or similar work, where an ordinary conversation is to be picked up in a room with the microphone hidden behind a picture frame or under a table, etc., then a special microphone adapted to this purpose should be obtained.

Two of the new $1\frac{1}{2}$ volt tubes (RK-42) are suggested for this apparatus, and these tubes will operate from an ordinary dry cell, or say two small "A" batteries which yield $1\frac{1}{2}$ volts each, the batteries being connected in parallel. Where portability and light weight are necessary, one of the new exceptionally compact type 45 "B" batteries may be used and where more power is required, two of these 45 units may be connected in series to give 90 volts plate potential. Another tube which is non-microphonic and which the experimenter might like to try in such a circuit is the No. 864. It is rated at 1.1 volts filament potential and uses 250 ma. instead of the 60 ma. required by the RK-42. A resistance is necessary to reduce the $1\frac{1}{2}$ volts down to 1.1 volts for these tubes.

Some experimenters may prefer to build this apparatus with resistance-coupled stages instead of using transformers which would, of course, reduce both the cost and most important, the weight. The microphone circuit is supplied from the same battery as the fila-

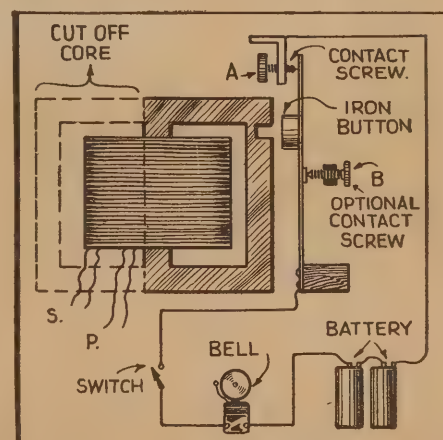


Radio parts come in handy for building an instrument such as this, which will greatly amplify ordinary speech for those hard of hearing.

ments of the tubes. The phones may be of the usual high-resistance type, or one of the new miniature type phones which fit inside the ear may be employed, these now being available in high resistance for use in the plate circuit. Others, of low impedance, are available and have to be used with an output transformer.

Relay Made From A.F. Transformer

● THE accompanying sketch shows how a sensitive relay may be made for radio control experiments, etc., from an old A.F. transformer; even though one of the windings is burnt out or open-circuited, the other winding will give sufficient power to work the relay. As the illustration shows, a slot is



Excellent relays may be made as shown above from old audio frequency transformers, even though one of the windings is open-circuited.

cut in the iron core with a nacksaw and the easiest way to cut this slot is to put several blades on the hacksaw so as to cut the full width of the slot at one time. The slot may be about $\frac{3}{8}$ " wide, and it may be cut to within $\frac{1}{16}$ " of the full width of the core leg. The half of the core leg at the left of the transformer, as shown in the picture, is cut away by means of a hacksaw. A vibrator spring or armature has a soft iron button riveted to it and this is mounted so as to come opposite the slot.

If the armature is to close the local circuit when attracted by the iron core of the transformer, then the contact screw is mounted as shown at A. If it is to close the local circuit when the transformer coil circuit is opened, then the contact screw is placed at B. The local circuit comprises merely a couple of dry cells and a bell or a signal lamp, etc.

World-Wide Short-Wave Review

—Edited by C. W. Palmer

A Novel Radio Map

● ONE radio fan, in England, devised a most novel map which is used in conjunction with his all-wave receiver. This map, which was described in a recent issue of *Practical and Amateur Wireless* (London) consists of two pieces of glass, between which the map is pressed, two illuminated tubes at top and bottom and decorative escutcheons to cover the illuminating tubes.

The illuminating tubes are formed of thin sheet iron, by bending the flat metal around a broom handle or other suitable form, leaving two flanges for securing the metal cylin-



One of the most elaborate radio maps we have seen; it can be easily constructed by any ambitious short-wave fan.

der to the glass plates. Inside these metal cylinders are placed a number of differently colored pilot-light bulbs, each color corresponding to a band on the receiver. The set is one of the type which has a different dial light color for each band and the lights in the map are supplied with current from the same leads, in parallel with the dial lights, so that whenever the receiver is turned on, the map is also illuminated and colored to match the dial—a different color for each band.

The map is painted with dots in color—depending on which band the particular stations are received, so that the stations which have been previously heard on any band can be picked out immediately by the color of the dot, the call letters and the frequency which are painted on the map in the same color as the dial light, and the map light.

The illuminated cylinders are secured to the glass plates by having the corners of the glass drilled by a glazier—or by doing the job yourself with a file and some turpentine.

This novelty map makes an attractive ornament for a den—besides being a useful tuning aid.

Transmitting and Receiving on 15 cm.

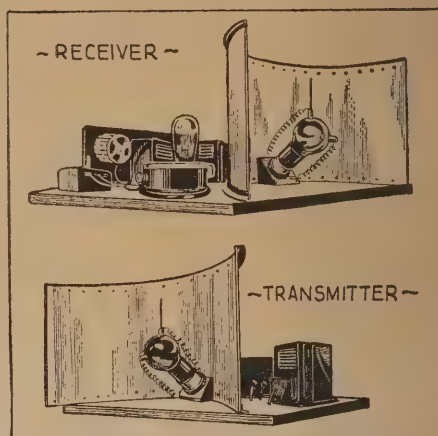
● THE French radio magazine *Toute le Radio* (Paris) contained, in a recent issue, a very interesting article on transmitting and receiving on wavelengths as low as 15 centimeters (about 6 inches), which can be applied to amateur radio experimental work.

The method of producing oscillations, without the need for magnetron tubes is credited to a French engineer—Francais Pierret. In this circuit, the plate of the tube is biased with a negative voltage of about 40 V. while the grid is supplied with a positive voltage of some 300 V. This action produces a movement of electrons which is extremely rapid around the grid and which produces a varying field, thus resulting in a flow of grid current.

The frequency of the oscillations thus set up is determined entirely by the tube constants and in the tube (French) used by the author of the article, a frequency of about 15 cm. (6 inches) resulted.

The oscillations are radiated by the use of a half-wave radiator connected directly to the grid, and changes in the resonant frequency are accomplished by changing the filament, grid and plate potentials. Metal reflectors of parabolic shape placed about 10 centimeters (4 inches) behind the aerial wire concentrate the field for directional radiation.

The receiver also is of odd construction, having no tuning coils and having a slight negative voltage on the plate with a positive voltage of some 160 V. on the grid. An A.F. choke (iron core) of 30 henries inductance is connected between the battery and



Appearance of the ultra-short wave transmitter and receiver, showing the metal reflectors.

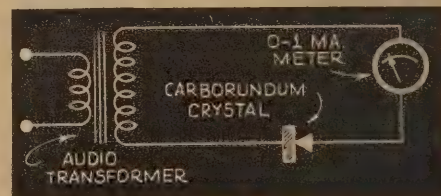
the grid to effect a detecting action. An R.F. choke containing 3 or 4 turns of No. 18 wire on a form the diameter of a pencil acts as a block for the oscillations picked up in the grid circuit. The plate bias is obtained by shunting a potentiometer of several hundred ohms resistance across the filament battery with the tap connected to the plate.

The receiver is also provided with a half-wave aerial, which, in both the transmitter and receiver, consists of a piece of stiff wire about 4 cm. (1.6 inches) long, soldered directly to the grid terminal of the tube.

In choosing tubes for the receiver and transmitter, the characteristics of each should be as nearly alike as possible, and the tube structure should be such that a high positive grid voltage will not injure the tube elements or bring the grid to a red heat.

A Signal-Level Meter

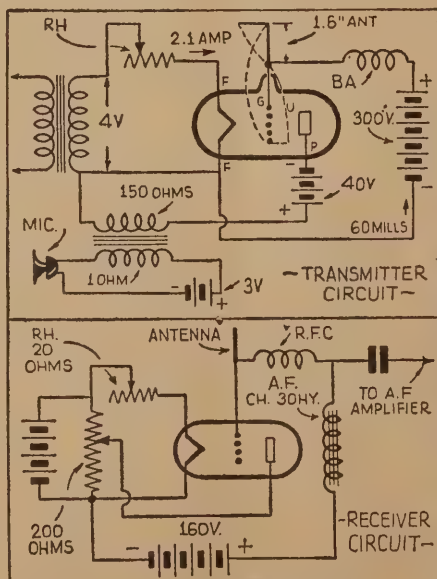
● A USEFUL meter which serves the dual purpose of output-meter for lining up new receivers to insure maximum results and relative signal-level meter or R-meter for determining the signal strength of stations



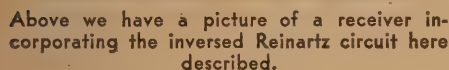
A crystal detector and a low-range milliammeter, and you have an excellent output and signal-level meter.

being heard is made very simply, according to a short description in a recent copy of *The Australasian Radio World* (Sydney) from an audio transformer, a carborundum crystal detector and a milliammeter.

(Continued on page 507)



Transmitting and receiving on the ultra-short waves is possible with the circuits here illustrated.



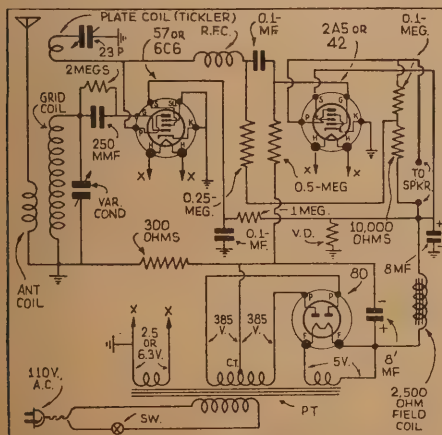
● AN interesting little set was recently described in *Wireless Weekly* (Sydney) by the editor of that lively little magazine from "down and under."

It appears that the editor in question made a visit to the U.S., last year, and stumped our friend John L. Reinartz with the question of what is the "Reinartz" circuit.

On returning to his native haunts, the editor stored up this bit of information (or the lack of it) and now we have the "Inversed Reinartz." This set is, strictly speaking, composed of a regenerative detector, resistance-coupled to a pentode output tube which uses reversed feed-back to reduce the distortion which is invariably present in pentode output tubes. A *10 per cent inversed feed-back circuit* is used in the output circuit, which is obtained by feeding the plate supply of the detector from a resistance network in the plate-screen circuit of the pentode. This supplies the plate voltage to the detector and at the same time feeds a small amount of the signal voltage in the plate circuit of the output tube back into the grid with a phase relation which causes degeneration—with a resulting improvement in tube characteristics and reduction in harmonic content.

This simple little set meets two requirements of our readers—(1) it is a simple set with high-quality characteristics for those who want a small set for short-wave broadcast reception, and (2) it is a simple matter to change over existing sets using pentode output tubes to use the *reversed feedback* arrangement shown, with a resulting improvement in quality of reception.

The values of the parts are shown on the circuit. Plug-in coils of standard size are



The inversed Reinartz circuit is worth experimenting with if you have not tried it.

O.K. for the tuning with a 50 or 100 mmf. condenser, depending on the size condenser called for with the coils you intend to use. The R.F. choke should be one of good make, having an inductance of about 10 millihenries inductance.

● **THE** editors are offering \$25.00 for a good 1-tube set, either in the form of a short-wave receiver or a converter. Please note that there is little use in sending in an ordinary hook-up for a 3-element tube as most of the circuits possible with these tubes have been published.

What the editors want are new circuits designed around one of the latest types tubes having a multiplicity of grids. Refer to the March, 1937, issue, page 675, where a very ingenious 1-tube S-W converter circuit is shown. This will give you some idea of what we are after. Refer also to other 1-tube diagrams published in this and other numbers, all of which will give you some ideas to work on.

As a preliminary, you may send in a diagram and a description of the set and a good clear photo or two of it. A list of parts should accompany the description and the editors, who will act as the judges, and whose opinion will be final, reserve the privilege of requiring the set to be sent to them for inspection and test if they so desire.

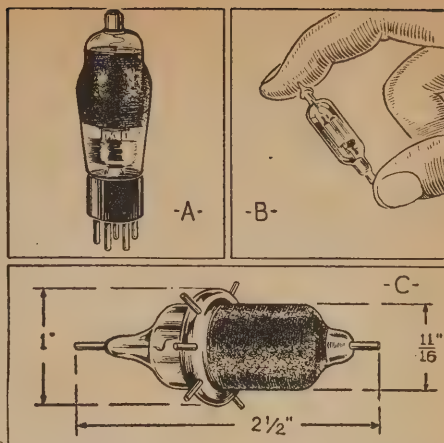
With the dual purpose tubes now available many ideas will suggest themselves. For example—Receivers with R. F. and Detector stages; Detector and A.F. stage; Detector and Plate-Supply Rectifier; 1-tube Super-het; Reflex set, etc.

● THE acorn type tube which has found much favor in the U.S. for high-frequency work has now found itself carried half-way across the world. The English Osram type ZA1 is an exact replica of the American made 955—though made in England by the Osram company.

A new tube of very small dimensions which has just been placed on the market in England is the Mazda midget diode type D1. This tube is similar to the Acorn types in that the leads are brought out as stiff wires through the glass seal, instead of the usual plug-in type base. This makes the tube very small and also tends to reduce the inter-electrode capacity, which may cause a dropping-off of high frequencies when a diode tube is used as a detector.

Another Mazda tube which has found its place on the English market is the type AC/SP3 which has an extremely steep plate-grid characteristic curve and has been designed particularly for television receivers. The high μ factor permits an appreciable amount of gain to be realized in the I.-F. stages of a superheterodyne television receiver, in spite of the high intermediate frequency which must be used to provide the two or three million cycle band needed for good definition in receivers of this type.

Another interesting development in tubes in Europe, in general, is the introduction of the so-called "International" series of tubes—which utilize the well-known octal base with either metal or glass tube construction. This is certainly a step in the right direction (that is, standardization of tube characteristics and base connections throughout the world.)



A—The English Mazda AC/SP3 for television; B—New midget diode type D1; C—The Osram ZA1, an R.F. pentode.

● **RECEIVERS** which will operate on short waves with very low plate voltages have been in some demand recently for portable work by hams and short-wave listeners alike.

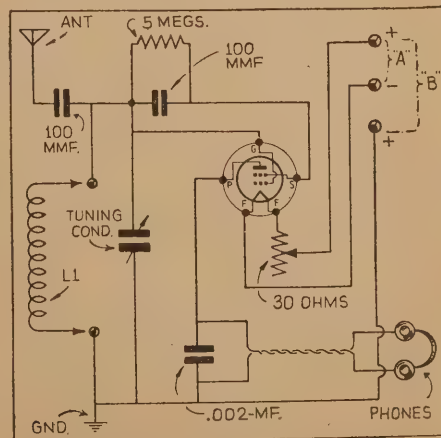
A circuit—called "*Le Negadyne*" in the magazine in which it appeared—*Radio Constructeur* (Paris)—is not a new one, having had some publicity in the U.S. as well as in Europe some ten years ago.

However, this circuit provides a fine regenerating detector, which will work on high frequencies—well into the ultra-short wave band—with only a few volts of "B" voltage applied.

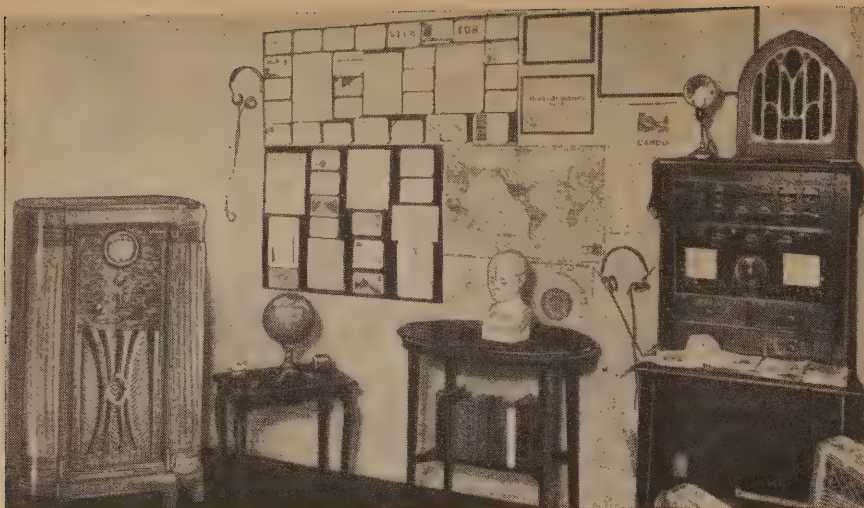
The circuit of the *Negadyne* as shown in *Radio-Constructeur* magazine is reproduced in the accompanying sketch. The tuning condenser value depends on the wave band to be covered. About 50 mmf. for the short wave bands and 5 mmf. for the ultra-short wave bands, with suitable coils is satisfactory. Any well-made short-wave coils can be used, if the plate coil is removed, leaving only the grid or tuned coil.

It will be noticed from the circuit that a tetrode tube (screen-grid) is used with an unusual connection of the two grids. Detection takes place at the second grid, while the first grid provides the condition of negative resistance which is so essential for sustained oscillation in a vacuum tube circuit.

This is a fine circuit for experimentally inclined readers. The values of parts are not critical and really surprising results can be obtained with high quality parts.



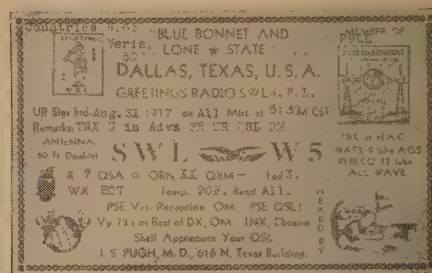
An interesting low voltage receiver circuit known as the Negadyne.



The elaborate listening "den" of Dr. J. S. Pugh of Dallas, Texas. The all-wave Philco receiver is shown at the left of the photo and the National AGS at the right. Dr. Pugh's SWL card appears at right.

M.D. Goes In For S-W Listening

The very handsome layout illustrated in the photo at the left is the short and broadcast wave listening "den" of Dr. J. S. Pugh, of 616 North Texas Bldg., Dallas, Texas. Dr. Pugh has heard sixty-five countries and has fifty countries verified. He uses a 60 ft. doublet antenna; the receivers used at his listening post are a National AGS, which may be seen in the cabinet at the right of the photo (with a complete set of plug-in coils visible just below the loudspeaker) and a Philco all-wave receiver.



Thanks for the "Brickbat!"

Editor,

I have been a newsstand subscriber of your magazine since 1933. *Short Wave Craft* for '33, '34, and '35 was a very good magazine. But for the past year and a half it's a dog (Our pet name for bad pictures.) Your average *short wave listener* couldn't afford to build even the rankest television set. When cathode ray tubes and electronic guns, etc., can be bought at a reasonable price, then your "Hams" and "Fans" will get busy. You're wasting paper at present. I doubt like blazes if you have increased your circulation any. Why not a proving ground of the receivers you advertise?

The Scout Trophy contest is a joke. Any pin-head, with enough money to buy a super-blooper and time to listen wins. The questions and answers are the only decent thing—or are they? Or, must one send the Question Box editor a quarter to find out that an .01 mf. condenser is to be used, not an .0001 mf. instead. After reading the flowery junk in the *Short Waves & Long Waves* column in the October issue, I de-

termined that you should have at least one brick-bat!

Lay off the flashy covers, the "plugs" for commercial sets; look over a '34 or '35 magazine and give the S.W.L.'s and *beginners* a decent magazine.

Dig up Doerle and put him back to work. None of us mind looking at advertisements, but for all of us, put some articles between said "advs." After all, most every advertisement appeared last month. 73.

JIM LYDON, Projectionist,
The Hamilton Theatre,
256 Bowdoin St.,
Dorchester, Mass.

UNCONTROLLED

Bouquets and Brickbats

(Ouch! Who threw that brick! Well, it seems, Brother Jim, that quite a few readers are interested in "what's doing" in television. So it looks as though we must publish a few photos and some description of the latest television inventions. Regarding the Scout Trophy Contest, we think that the man with the superior set should win, due to the greater sensitivity and selectivity of such a set. At any rate it's a pretty sporting proposition, isn't it, if a fellow with a 3 or 5 tube receiver wins? We're trying to follow some of your other suggestions and hope in time to fully satisfy you. We shall be glad to receive further constructive criticisms.—Ed.)

We Salute Dr. M. Hausdorff!



Photo at the left shows the very business-like short-wave listening station of Dr. M. Hausdorff, of Lugano, Viganella, Switzerland. His station call letters are HB9RBX. Italian, French, and English are spoken at this station and a very beautiful QSL card is sent to listeners who contact Dr. Hausdorff.

Editor,

It gives me a pain in the starboard gain control, to read the squawks and grumbings of these neophyte brethren who make a habit of soliciting QSL cards. It would be better, much better, if they would stick to collecting bottle tops, book match covers or stamps, and leave the exchanging of QSL cards to those of the licensed fraternity that go in for that sort of thing. This SWL QSL situation is getting to be an infernal nuisance, the SWL don't send amateurs cards because they want the amateur to have an accurate report on his signal, their only interest is collecting cards. (And how come the SWL cards always give R9 reports?)

Just whoineel wants to get a card stating, (heard you R9 in Static Island, N.Y., while talking to VK9ZL). Any amateur that has operated a transmitter for a few weeks, knows the capabilities of it, and the consistent distance he can work, and neither wants nor requires reports from SWLs. The amateur that collects QSL cards, wants his cards to read "Worked" not "Heard." I advise SWLs to pay a visit to some of their local amateurs, and see how many SWL cards they will find tacked to the wall. I've been around a bit in the seventeen years that I have operated amateur stations, and the only place I've ever seen "Heard" or SWL cards, was stowed away in some drawer or in the waste-basket. So why don't the SWLs wise up and save their time and money, and send their cards to the short wave broadcast stations, who will no doubt appreciate the reports.

(Continued on page 527)

A Dandy "Ham" Rig

Editor,

Herewith a photograph of my amateur station for your *very good* magazine.

The rig consists of three stages; namely, an RCA—802 Tri-Tet crystal oscillator capacity coupled to an RCA—841 which is used as a straight buffer link coupled to an Eimac 50T final amplifier. The transmitter rack consists of five shelves, the one on the bottom housing the filament transformers, one for each tube including the 866's and 5Z3 rectifier tubes. A large transformer which delivers 1000 or 1500 volts under load is used exclusively for the final. Another transformer, delivering 700 volts is used for the oscillator and buffer. The second shelf houses the filter condensers and chokes for both power-supplies. The third shelf houses the oscillator and buffer stages which are completely shielded from each other. The fourth shelf contains the final amplifier. The top shelf houses the Collins Pi antenna-matching network.

The transmitter is operated on the 14, 7, and 3.5 MC bands, having plug-in coils for each band. 80 meter crystals are used to double to 40; 40 meter crystals to 20. The antenna is a Hertz 66' flat-top with a single wire matched impedance feeder. The antenna height is 50' above the ground. Inputs up to 200 watts are used on the 40 and 80 meter bands and 100 watts on 20 meters.

Contacts have included all U. S. Districts, Canadian VE-3, VE-4,



Harold E. Davis, W5FFW, of Tulsa, Okla., has a dandy "rig."

OSCILLATIONS

from Our Readers

VE-5, Mexico, Cuba, New Zealand, and Australia.

The receiver is a National SW-3 which is shown on the extreme left hand side of the desk, a single '45 audio amplifier furnishes the additional audio to drive the dynamic speaker shown on the shelf. The station's monitor is shown to the right of the receiver.

HAROLD E. DAVIS, W5FFW
439 South Troost Ave.,
Tulsa, Oklahoma.

A Good Suggestion

Editor,

I am a short wave listener away out here in the Hawaiian Islands and I would like to exchange SWL cards with other listeners all over the world, so come on OM, OL, OG, YL, XYL.

I have been a reader of your wonderful magazine for a long time and I think that it is about the best publication I have ever looked at.

Mr. Editor, there is one thing that I have often wondered, that is could it be arranged to publish in your good magazine a list of S.W. Stations that are known to *not* send out verifications. I think that would be a very good thing for the new listeners to know; in fact I would like to know it myself.

So at this time I thank you for your wonderful magazine, and if you can help me to exchange SWLs, I will be very glad.

I will say "Aloha nui loa," from Hawaii.

WILLIAM H. HAWKINS,
810 Kopke Street,
Honolulu, Hawaii.

"Pre-Selector" Works Swell!

Editor,

I have just completed the pre-selector printed in your 1937 September issue. It works swell and it has improved my recep-

tion very much. I have also built many two and three-tube sets described in your magazine and have heard *foreign* countries on every one.

I am a constant reader of your magazine and think it is the *best* magazine that is being printed today in the line of radio. KENNETH THOMAS, 318 S. 10th St., Quincy, Ill.

Likes The "Kink" Dept.

Editor,

Three years ago I became interested in radio and television. An old-timer in radio told me to pick up a copy of *Short Wave and Television*. I took his advice (I now realize what excellent advice it was) and have continued to be a reader of *Short Wave and Television*. In your magazine I have found just what I wanted, explained in clear and understandable language that a beginner can understand.

Your articles and illustrations on *television* clicks with me 100 percent.

I sometimes ask myself, "How could I ever do without your useful Kinks?" Here's hoping you get more and better *kinks*.

Your circuits bearing the "tested and approved, certified seal" have always proved much better than my greatest expectations. Java, Germany, England, Guatemala, Italy, Peru, Japan, Colombia, Canada, Venezuela, Cuba, Mexico,

etc., are often picked up on my *Short Wave and Television* "certified" circuit.

I would greatly appreciate corresponding with persons in any country. I have a useful free gift for foreign readers who write me an interesting letter. I'll be more than glad to answer all mail I receive.

To all short-wave and television enthusiasts and to the editors of *Short Wave and Television* I say, 73.

EUGENE COTTER,
1104 East Elm Street,
West Frankford, Illinois,
U.S.A.

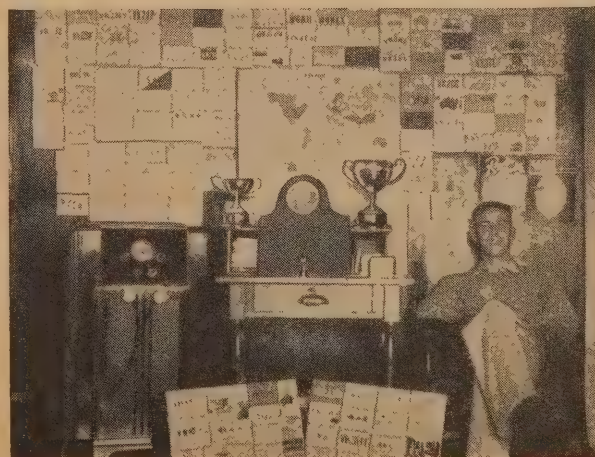
(Thanks very much, Eugene, and we hope to receive many more constructive letters from our readers. If you don't see what you want in the magazine, tell the Editors, as that is the only way in which they will become acquainted with the requirements of yourself and other readers. When enough requests are received for a certain type of article or set, we'll try to obtain it.—Editor.)

A Boost from New Zealand!

Editor,

I am submitting my QSL card and a photo of my receiving station. If you would mention it in *Short Wave & Television*, that I would be pleased to exchange QSL's and photographs with United States SWL's, I would be very grateful.

(Continued on page 527)



Short-wave "listening post" of W. D. McComb of Auckland, New Zealand.

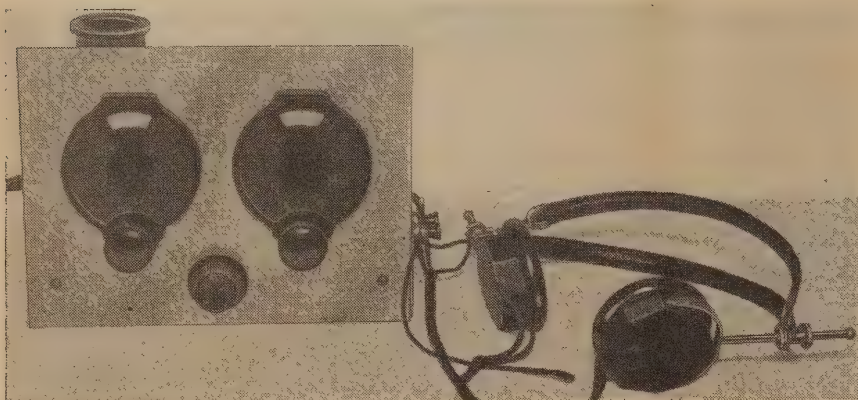
A 2-Tube Receiver for the Beginner

Detector and two audio stages are obtained with only 2 tubes—the tubes used are the new 1.5 volt type, which operate from a single dry cell. Band-spread is provided and this makes an ideal receiver for the beginner.

By George W. Shuart
W2AMN



Beginner



With this little 2-tube receiver, which has band-spread incorporated, short-wave stations in foreign countries may be tuned in easily with surprising strength.

● IT IS safe to say that nearly all radio fans and experimenters start their careers with *battery-operated* receivers. There are two definite reasons why, first—a battery-operated receiver is less costly than other types which are operated from the power mains, and second, a battery-operated receiver is less complicated in construction and more likely to yield good results at the first try.

Battery type receivers are not new by any means, but this one is different and more appealing to the beginner because of the type tubes used. The battery type tubes with which we are most familiar are those requiring two volts for the filament, usually obtained from two dry cells with a series resistor in order to drop the three volts supplied by the batteries to two volts for the tubes.

New 1½ Volt Tubes Used

The new Raytheon battery-type tubes require just one and one-half volts, which makes them workable from one dry cell. This greatly simplifies matters because with the older type tubes and two dry cells there was danger of operating the filaments at too high a voltage and thus ruining the tubes in a short time. In order to obtain proper results and normal tube life one had to make use of a voltmeter, which most beginners could not afford or did not want to invest in. These new tubes solve all our problems, including tube life and the investment angle.

At this writing there are only two types of these new tubes available. The RK-42 is

comparable to the type 30 and the RK-43 is very much like the 19 twin triode. It is not at all unlikely that other types, such as the screen-grid R.F. tube and the pentode audio amplifier, will be made with 1½ volt filaments in the near future.

Those of our readers who already have battery sets which are giving satisfaction, can replace their present type 30's and 19's with these new tubes with equal results. The only change will be in the filament supply as outlined before. The rheostat may be left in the circuit and the resistance increased as much as required for normal operation. Of course it would not be advisable to use the new tubes in receivers using two volt tubes not made with the 1½ volt fila-

The plug-in coil for the desired band fits into the socket at the right of the set. The two 1.5 volt new type battery tubes are here observed in place on the chassis.

ments, because there is danger of applying the higher voltage to the new tubes in an unguarded moment and burning out their filaments.

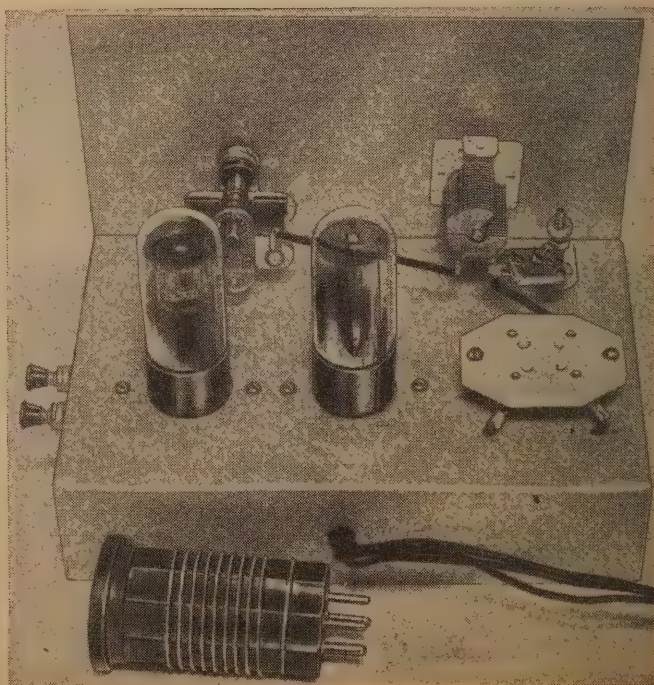
Detector and 2 Audio Stages with but 2 Tubes

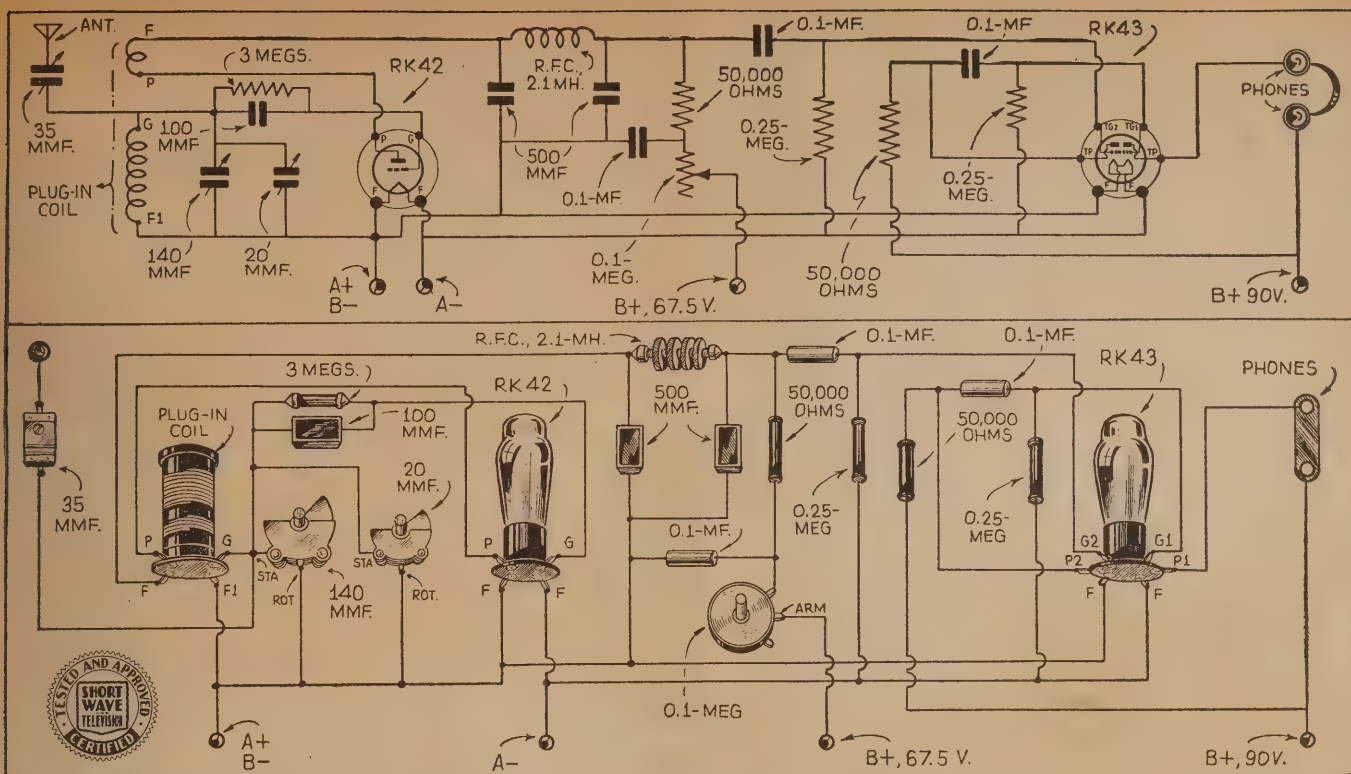
The receiver shown in the photos uses the RK-42 as a regenerative detector and the RK-43 as two stages of resistance-coupled audio frequency amplification. This combination provides three-tube performance with only two tubes. A receiver such as this one is capable of receiving short-wave stations from all parts of the world. There is practically no limit to the distance which this receiver will cover. So long as general receiving conditions are favorable, this little set will work wonders.

The receiver is built on an aluminum chassis with an aluminum panel. The chassis is 5 inches wide, 2 inches deep and 8 inches long. The panel is 5 x 8 inches. This seems to be the most suitable size for one and two-tube receivers. Looking at the back of the receiver we find the plug-in coil on the right and the detector tube is next in line, with the audio amplifier on the extreme left.

Band-Spread Tuning Provided

Two tuning condensers are used in this receiver, one is for *band-spread* tuning and





Wiring diagrams, both schematic and picture type, for the 2-tube beginner's receiver are herewith presented. Even though the reader has had but little experience in building sets, he will find the picture diagram very simple to follow.

the other is what is termed a *band-setting* control. The small condenser is connected in parallel with the larger one and has a capacity of 20 mmf. The large one has a capacity of 140 mmf. This is the most simple method of obtaining *band-spread* and its effectiveness is born out by its use in thousands of receivers now in use by amateurs for communication purposes. The front view of the receiver places the band-spread condenser on the right and the main tuning or band-setting condenser on the left. The control located between the two dials and at the lower edge of the panel is the *regeneration control*. This is a 100,000 ohm potentiometer, although only two terminals are used, making it work as a series resistor which varies the plate voltage applied to the detector tube in order to control regeneration. This method of controlling regeneration in a triode detector is the smoothest and is most satisfactory in many other respects.

Starting with the antenna condenser a description of the circuit follows: This condenser is a 35 mmf. adjustable type, used to couple the antenna to the grid circuit of the detector. Its adjustment is rather critical in that it must be adjusted for each plug-in coil in order to obtain optimum results. The coils used are standard Hammarlund, four-prong two-winding coils. However complete data is given in the table at the end of the article in order that the experimenter may construct his own coils if he so choose. These coils are wound so that the tickler or small winding is at the prong end of the form. The proper connection of the terminals of the coil is very important. The extreme bottom lead of the tickler winding goes to the plate of the detector tube, while the extreme top lead of the grid coil goes to the grid of the tube. The other connections are clearly

shown in the diagram. The two windings must be wound in the same direction with the above method of connection.

The size of the grid-leak is not important but must be between 3 and 5 megohms. The other resistors in the audio circuit are likewise not critical as to values—those shown in the diagram provide proper results.

No external bias batteries are needed with the connections shown in the diagram. The grid returns are connected to the A minus, while the B minus is connected to the A plus. This puts a slight bias on the audio tube

while the detector grid returns to the A plus and receives no bias. The grid-leak in the detector circuit is for biasing.

Tuning the receiver is the same as for any other receiver and the way to learn is by practice, there being no set rule. A few pointers may help the beginner—Plug in the coil which covers the lowest wave band; this is the easiest to adjust. Then advance the regeneration control about three-quarters of its range and tune with the large tuning condenser. A whistle or some other signal will be heard. An adjustment of the antenna condenser and the regeneration control together with retuning the main dial, will show the operator what each control does and how it affects reception. Practice on this band until you are familiar with the operation of the receiver and then try your luck on the other bands. As the wavelength becomes shorter the controls become more critical. The use of the band-spread condenser is simple; set it at mid-scale on the dial and tune with the large condenser. Then, with the large one set to bring in the band in which we wish to operate, we use the *band-spread* condenser for further tuning. A single wire seventy-five feet long from set to far end of aerial, is the best *general-coverage* antenna for a set of this type.

Parts List For Receiver

I.R.C. RESISTORS

1—3 meg 1/2 watt resistor
 2—1/4 meg 1/2 watt resistor
 2—50,000 ohm 1/2 watt resistor
 1—100,000 ohm potentiometer

CORNELL-DUBILIER

1—.0001 mf. mica cond.
 2—.0005 mf. mica cond.
 3—.1 mf. bypass cond.

HAMMARLUND

1—set SW-4 plug in coils
 1—140 mmf. variable cond.
 1—20 mmf. variable cond.
 1—4 prong socket
 1—6 prong socket
 1—35 mmf. trimmer cond.

RAYTHEON

1—RK 42 tube, 11/2 volt type
 1—RK 43 tube, 11/2 volt type

BRUSH DEVELOPMENT CO.

1—pr. crystal head-phones

Coil Data for 2 Tube Beginner's Receiver

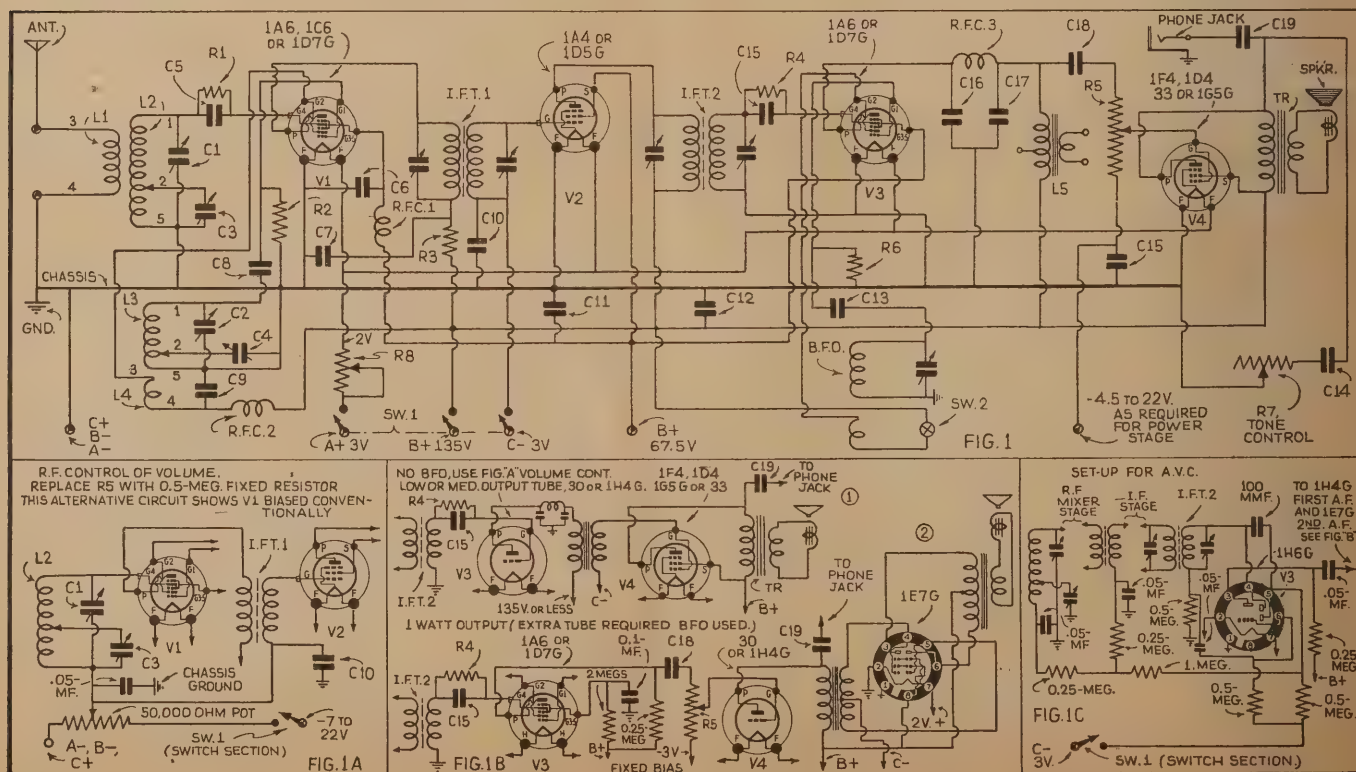
Range Meters	Grid Turns	Tickler Turns	Winding Space	Size Wire
135-270	82	16	1 7/8"	No. 28
66-150	38	11	1 3/8"	No. 26
33-75	18	6	1 1/2"	No. 24
17-41	9	5	1 1/4"	No. 16
9-20	3 1/2	3	1"	No. 14

All coils wound on 1 1/2" diameter ribbed forms. Space between grid coil and tickler 1/4". Winding space is length of winding. Primary is wound between turns of grid coil. All ticklers wound with No. 30 D.S.C. wire.

(Continued on page 512)

Schematic wiring diagram for the 4-tube portable All-wave receiver is shown below; picture diagram on the opposite page.

As we have indicated, the construction is physically split into two units, of like size and appearance—both equipped with leather carrying handles and both built of crackle-finished, heavy-stock steel plate, affording complete protection to inside parts. One of these cases houses the required A, B, and C batteries; it carries, too,



SUPERHET 4

P. Adams

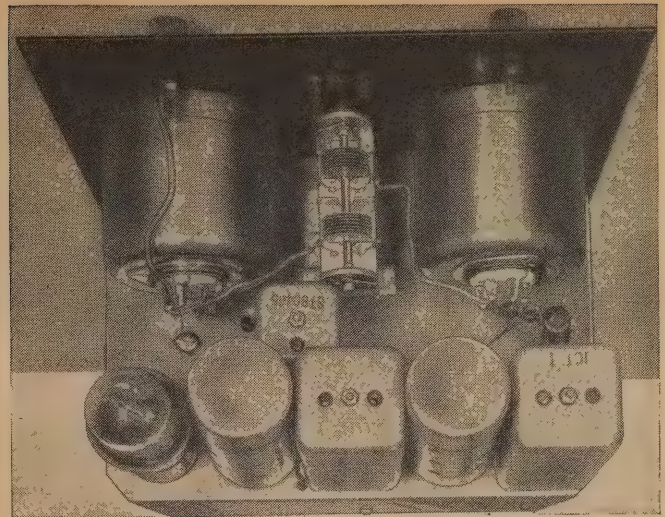
a compartment for phones, antenna wire, etc. The second cabinet contains the receiver proper—the chassis, the controls and the 3-inch P.M. speaker; the space between the speaker pot and the back of this cabinet is used as a housing for extra plug-in coils. Battery unit and receiver are connected together for set operation by means of a five-foot cable with plugs at both ends; the cable may be conveniently stored in the upper compartment in the power-supply case.

Tubes required: The four tubes required are a 1D7G pentagrid mixer (or 1A6 or 1C6, with socket change), 1D5G I.F. amplifier (or 1A4), a second 1D7G (or 1A6) as second detector and beat oscillator, and a 1G5G output pentode. So far as the second detector and the audio tubes go, the line-up is typical rather than definitive. If no beat note is required, the second pentagrid may be replaced by either a triode, a straight screen-grid job, or a diode-triode or diode-pentode combination; if the 1G5G does not afford a desirable output for speaker operation, it may stand substitution in the way of 33, (with socket change and increased B voltage) or a 1E7G; and in the event of use of the latter tube, either a diode-triode second detector followed by an A.F. triode, or a triode detector followed by an A.F. triode, would seem proper for good driving to 1 watt output.

The speaker is small, exceptionally sensitive, gives good tone, and is ideally suited to the design, both electrically and physically.

Plug-in R.F. (radio frequency) coils—two for each band to be covered—are used; these are equipped with knobs for convenient front-panel change. Coverage of short-wave, broadcast, and long-wave bands is possible—the one limitation, of course, being the available room for coil storage. All I.F. transformers are of the iron-core type, resulting in high usable gain. All high frequency parts are isolantite mounted.

Below—picture wiring diagram which will enable even the beginner to build this very efficient 4-tube portable.

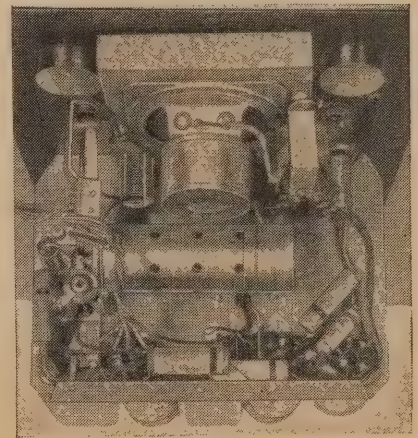


Top view of the 4-tube portable R.F. section, showing the I. F. transformers and plug-in coil shields.

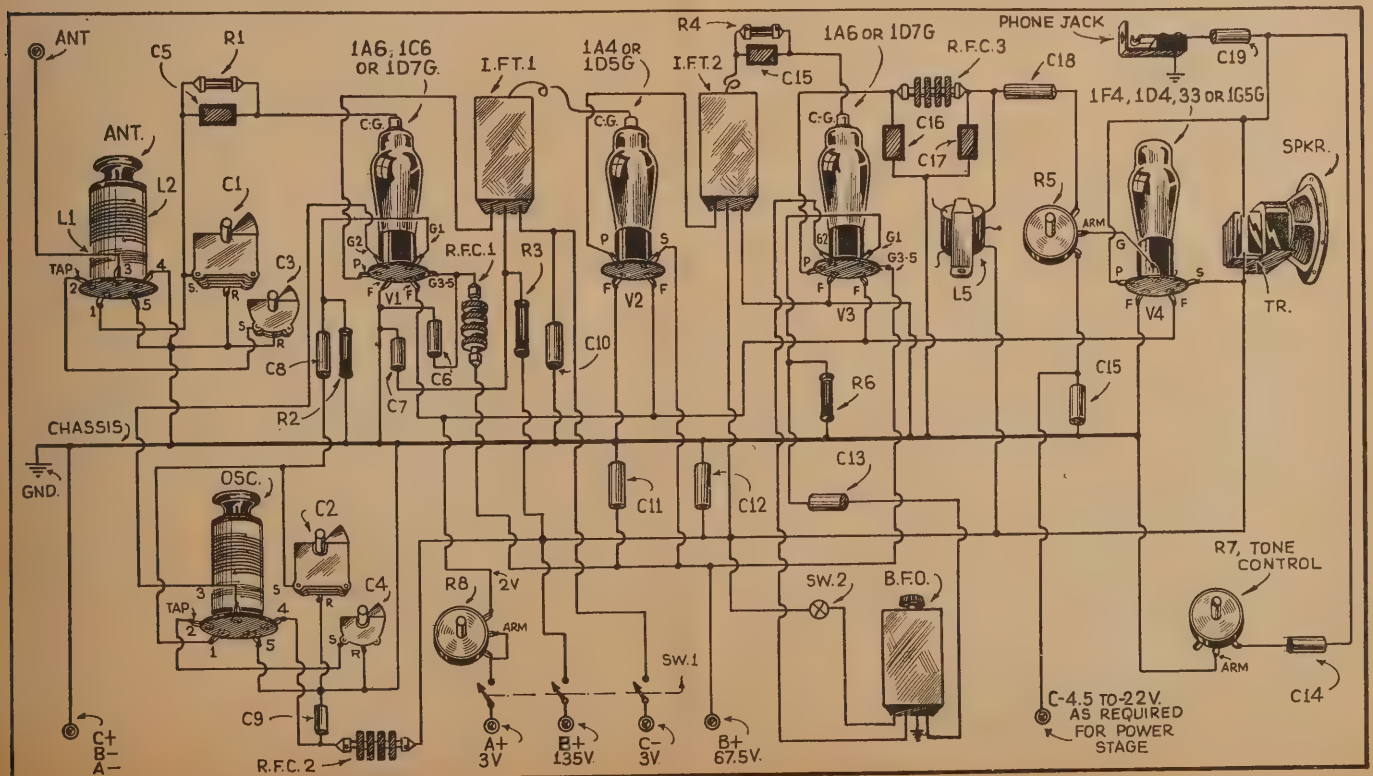
We might mention—before passing on to an analysis of the circuit—that the receiver is most universal in its possibilities of service and application; it is good as a straight broadcast job (here two sets of coils only will be required), as an all-wave receiver for general portable use, and as a battery super for the communicating amateur.

Superhet Circuit Used Is Very Effective

An R.F. stage was held out of the (Continued on page 508)



Above—The audio-frequency section of the receiver.





Front view of the 4-band superhet receiver.

This receiver gives 4-tube results with 3 tubes. Among other features it has band-spread, beat-frequency control and band-switching. The set is of rack and panel type construction and its low construction cost will appeal to all S-W "Fans".

A 4-BAND, THREE-TUBE Superheterodyne Receiver

● SOME of the objectives sought in designing this set were, simplicity, economy, commercial appearance, ease of construction, convenience of operation, rack and panel standardization and provision for enlargement without discarding any parts.

Simplicity: Simplicity was obtained by practical one dial band-spread tuning in connection with a band-set padder. Only five controls appear—the main dial, the padding condenser, the band-switch, the volume control and the beat-frequency oscillator and regeneration control.

Economy: Economy was aimed at by employing only parts absolutely necessary, and building parts whenever possible instead of purchasing expensive ones.

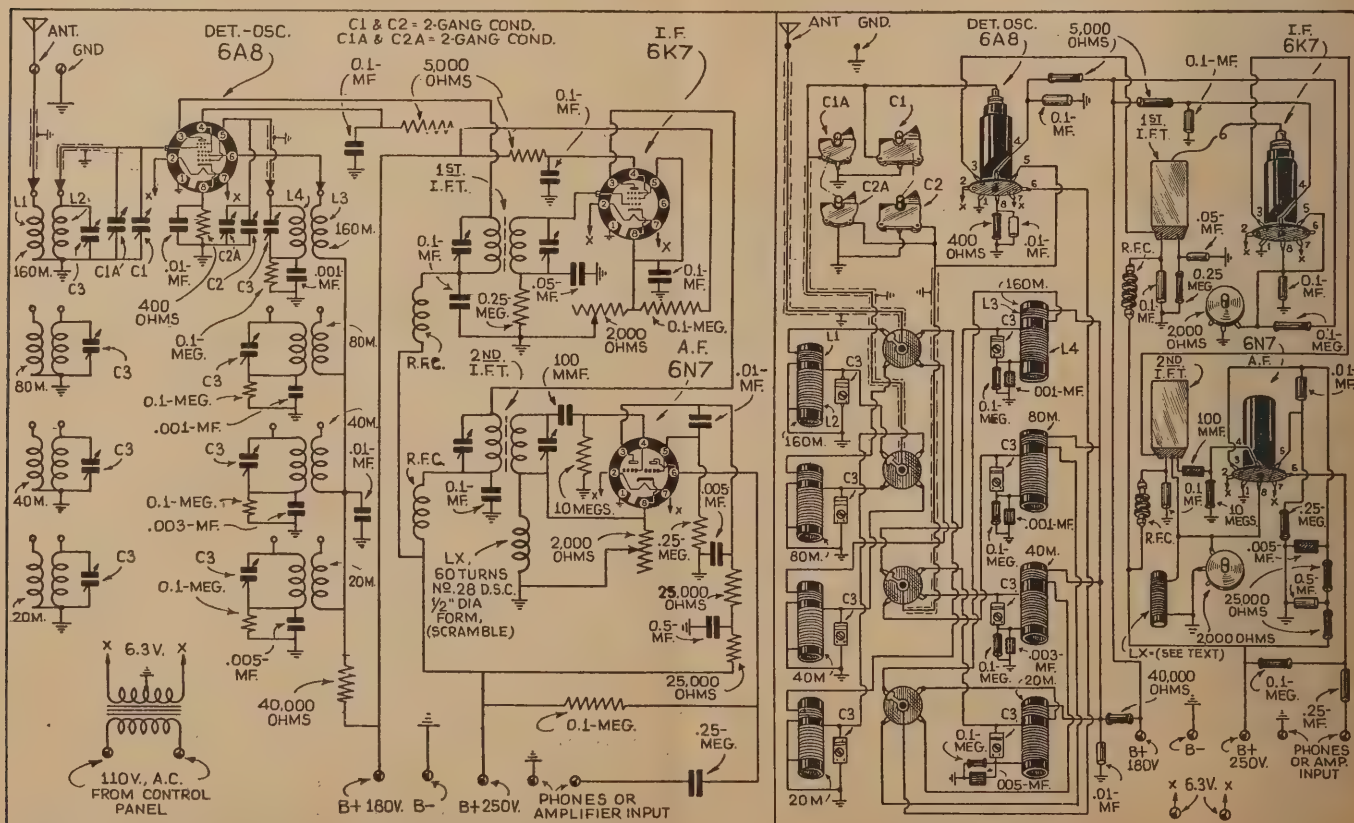
By Jim Kirk, W6DEG

Other features: The commercial appearance, ease of construction and convenience of operation are all tied up in the rack and panel construction used. Of course, rack and panel construction meant *band-switching* instead of plug-in coils (unless a space could be left above the set to plug in coils and that was not thought desirable). Even if rack and panel construction had not been used, *band-switching* is much to be desired for rapid changing and eliminating a basketful of coils.

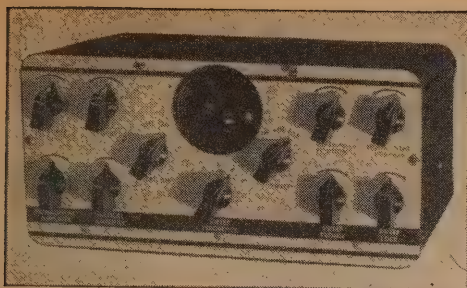
Panels: I have tried many different forms of panels at a great expense before I hit upon the panel material I am using now.

What I was looking for was low cost, sturdiness, appearance, and ease of working. Thick aluminum, crackle finished or polished, was tried first. It answered every requirement except low cost. When I used thin panels to cut down the cost, they were too flimsy. Thick steel panels were not much less in cost and they required too much labor to prepare and drill. Plywood or Masonite satisfied the requirements except that they did not shield and could not be easily and cheaply finished and still look as handsome as metal. So the final choice was plywood panels with a crackle-finished thin metal front.

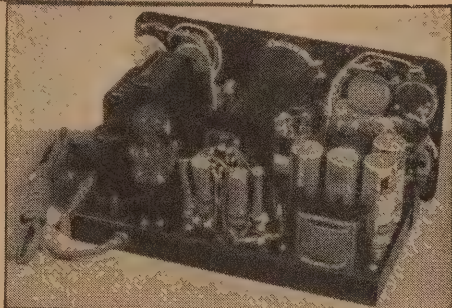
When it is desired to make changes all that is generally (Continued on page 519)



Wiring diagram for the 3-tube receiver which gives 4-tube results. The different frequency bands are available at the turn of a switch.



Above—Front view of the new Thordarson oscilloscope; the parts for building it, together with diagrams and instructions, are now available to every experimenter. (No. 672)



Right—Rear view of the very complete oscilloscope.

The LATEST in Short-Wave Apparatus

The new apparatus here described has been selected for description by the Editors, after a rigid investigation of its merits.

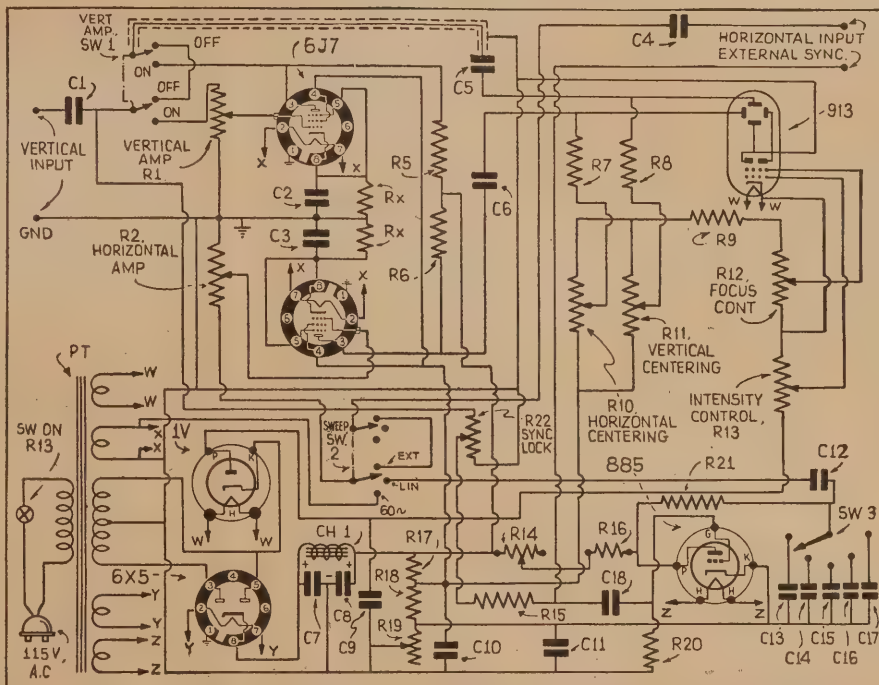
New Cathode Ray Oscilloscope

● A handsome looking and very complete oscilloscope, using the 913 cathode ray tube, is shown in the accompanying photos. This oscilloscope was developed by the Thordarson engineers, and it will perform practically all of the tasks that any radio experimenter might encounter and there is a provision for double-image R. F. alignment. This instrument may be used for measuring the percentage modulation of a transmitter, analyzing and locating hum; measuring audio distortion in either the transmitter, speech equipment or the receiver and the alignment of receivers with high fidelity A.F., R.F. and I.F. sections. Instructions and diagrams are furnished, also complete instructions of just how to wire the instrument and mount the parts.

The experimenter will be interested in the circuit diagram given here together with the parts list. One of the leading lens-makers devised a special non-distorting lens for this instrument, and this is mounted in front of

(Continued on page 524)

Wiring diagram of new Cathode Ray Oscilloscope of the "build-yourself" type.



New 5-Tube Battery Superhet



required are a 2 volt air-cell, or a 2 v. storage or 3 volt dry "A," and 3-45 v. "B." (No. 669.) Prepared from data supplied by the courtesy of the Crosley Radio Corp.

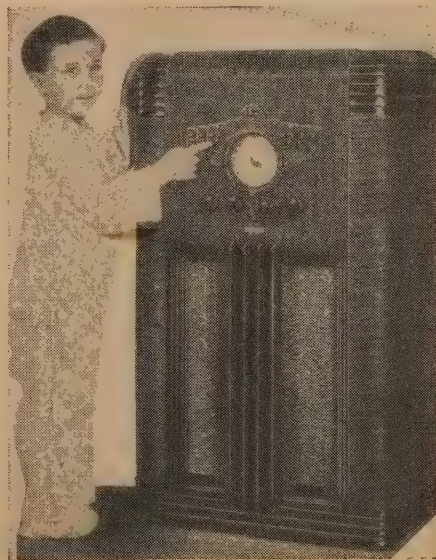
● THE photo at the left shows a new battery-type, all-wave receiver which, beside tuning in the broadcast band, also receives foreign short-wave broadcasts in the 5,800 to 15,400 kc. range. It is a 5-tube superheterodyne designed by Crosley engineers. The set has the new illuminated mirror-dial. Batteries re-

13-Tube Superhet Has Touch Tuning

● THE handsome looking console radio receiver illustrated at the right is the new Lafayette 13-tube superheterodyne with electric touch tuning. This set is equipped with eight buttons for receiving broadcast stations. Adjustment is exceedingly simple and can be made by anyone with no previous experience. Thanks to a new circuit design, frequency drift is virtually eliminated the engineers claim, assuring peak resonance tuning at all times.

Among its many other features

(Continued on page 507)



Names and addresses of manufacturers of apparatus furnished upon receipt of postcard request; mention No. of article.

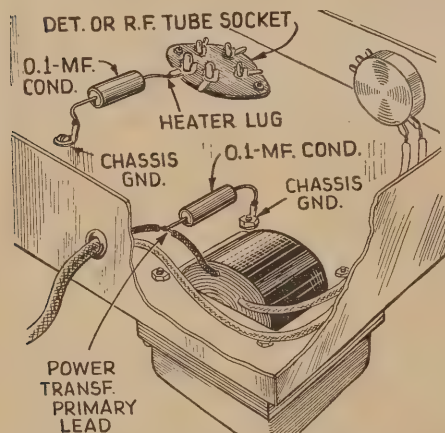
The Listener *Asks*

Questions asked by not-so-technically inclined
listeners are answered in this new department.

TUNABLE HUM IN RECEIVERS

Q. In operating my short-wave receiver I notice that as soon as a station carrier is tuned in a hum is heard. This hum never occurs at any other time. What can I do about it?

A. This type of trouble is fairly common in electrically operated receivers. It is caused by interaction between the heaters and cathodes of the tubes. The remedy is quite simple; connect an .1 mf. paper by-pass condenser from the chassis ground to one of the heater leads of an R.F., I.F. or detector tube of the receiver. Also connect a condenser of similar value from one side of the 110 v. primary of the power transformer to the chassis. This second condenser should have a working voltage of at least 400 volts. In almost all cases this will cure the trouble.



Additions to receiver for reducing tunable hum

ODDITIES OF SHORT WAVE RECEPTION

Q. During the past summer I heard many European stations during the evening on the 19 meter band with very good signals. Now I find that these stations have gradually faded out and are seldom heard. Is my receiver at fault?

A. This is a natural phenomena associated with short waves and has nothing to do with your receiver. Certain wavelengths are good for long distance reception only at certain seasons of the year.

In the summer months the higher frequencies give much better results than the lower frequencies, whereas in the winter months the lower frequencies give the best results. The stations you heard during the summer on certain wavelengths naturally will not be heard very well with the coming of winter.

Most stations change their wavelengths with seasons and you will now find that the principal European stations are operating on

so-called winter frequencies, which are considerably lower than those employed in the summer. If you take the trouble to tune in the lower frequency short-wave broadcast bands, you will now find the same European stations coming in very well. When spring returns the situation will reverse itself.

DIFFERENCE IN TIME

Q. Will you please tell me the difference in time between a few of the principal cities in the world.

A. The attached chart shows the difference in local time of various cities all over the world. This chart is computed with 12 o'clock noon, Eastern Standard Time, the time of New York City, as a reference.

New York	12 Noon
Chicago	11 a.m.
San Francisco	9 a.m.
Hawaii	6:30 a.m.
Sydney	3 a.m. (Tomorrow)
Tokyo	2 a.m.
Manila	1 a.m.
India	10:30 p.m.
Moscow	8 p.m.
South Africa	7 p.m.
Berlin	6 p.m.
Holland	5:20 p.m.
London	5 p.m.
Rio De Janeiro	2 p.m.
Buenos Aires	1 p.m.

TUNING DIAL DRIFT

Q. I find that on my short-wave receiver it is necessary to reset the dial three or four times to hold a station in tune during the first hour the set is on. What causes this, and what can I do about it?

A. This trouble is caused by several factors in the receiver and is generally a function of the design of the set. After a receiver is turned on it begins to warm up. The longer it is in operation the hotter it becomes. This causes expansion of metal parts and it is this expansion which alters the values of the tuning circuits to a considerable extent, making it necessary to retune the receiver. The effect is most noticeable on the higher frequencies where small changes in the components cause a large change in frequencies.

This trouble is usually due to faulty receiver design and a good receiver should not drift more than 1° on the dial between the time it is turned on and the time it is thoroughly warmed up. Not much can be done to correct this condition in a factory-made receiver, because it depends upon the position of parts, ventilation in the chassis, and quality of the components in the affected parts of the receiver. In a home-built receiver care should be taken that adequate ventilation is provided around the oscillator,

first detector tubes and their associated parts.

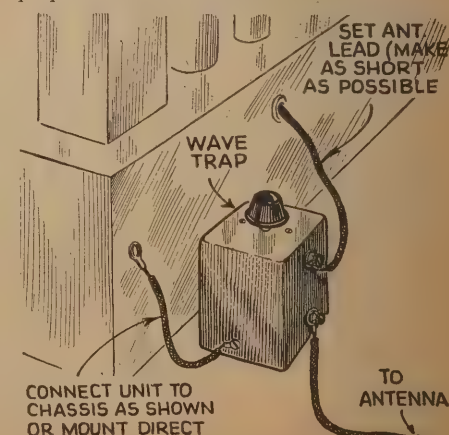
The use of air dielectric trimmer condensers in the oscillator tuning circuits greatly reduces this trouble. The particular type of circuit used for the oscillator plays a large part in the amount of drift. Electron-coupled oscillators are much less affected than other types.

ELIMINATING CODE INTERFERENCE

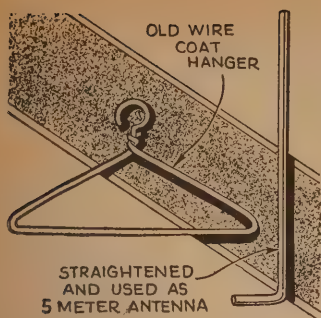
Q. I have an all-wave superhet receiver. I am frequently bothered with code interference which appears on all bands no matter what the setting of the tuning dial. What steps can be taken to eliminate this?

A. This type of trouble is peculiar to super-heterodyne receivers and is caused by code stations operating on the same frequency as that to which the intermediate frequency amplifier of the receiver is tuned. The signal generally comes in through the aerial, passes through all the preselector stages and into the I.F. amplifier.

The remedy is to insert a wave trap which is tuned to the set's intermediate frequency between the aerial and receiver. This trap must be placed very close to the receiver. In fact, the ideal position would be to mount it on the receiver chassis. The sketch shows the proper method of connecting such a unit to a receiver. The aerial connection on the receiver goes to one terminal and the lead-in wire from the aerial system connects to the other terminal. The wave trap has an adjustment control built into it. To secure the proper adjustment turn the receiver on and wait until the code interference starts, then slowly turn the adjustment control on the wave trap until the interference disappears. Once this adjustment has been made no further attention is necessary. The unit has absolutely no effect on the receiver's efficiency in picking up stations. A trap which may be tuned from 400 to 500 kc. is proper for most receivers.



Connecting a wave-trap to eliminate code interference



A COAT HANGER AERIAL

1st Prize Winner

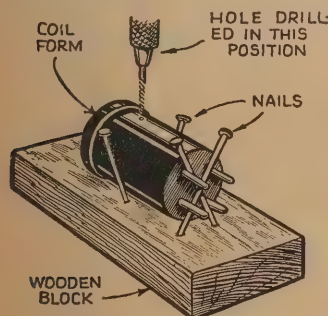
One of the most serious problems confronting America today is what to do with old coat hangers! This problem is second only to that of disposing of old razor blades.

The problem of old coat hangers has been neatly solved for short-wave addicts by this Kink. All you do is take an old wire hanger and straighten it out into a nail form as shown in the sketch. It makes an admirable 5-meter antenna.—Harold Brace, Jr.

COIL HOLDER

Here is a handy device to hold a coil form rigid while it is being drilled.

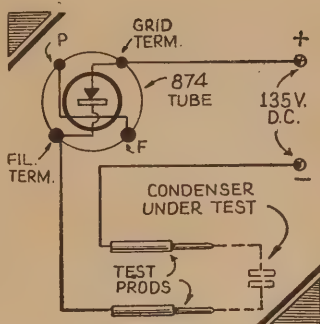
As the sketch shows, four nails are placed in a wooden block to form a sort of cradle for the coil form. The prongs of the form engage two of the nails and prevent the form from turning. It is then a simple matter to drill the required hole.—L. B. McCullough, M.D.



A CONDENSER TESTER

An effective condenser tester can be rigged up by using an old 874 gaseous tube. The wiring arrangement is shown in the diagram.

A pair of test prongs is necessary to test the condenser. Place the test prongs across the two terminals of the condenser. If the condenser is good, the tube will glow for an instant and then go out. If the condenser leaks, the tube will light continuously with a faint glow depending upon the magnitude of the leak. On the other hand, if the condenser is shorted, the tube will light continuously with a very bright glow, the same as it would if the two test prongs were shorted together. This test is most accurate for paper condensers.—John Roche.



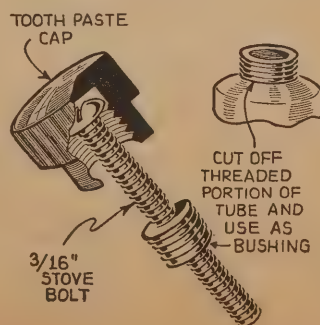
DIAL REPAIR

Tuning dials which make use of a friction belt frequently develop trouble when the belt begins to slip. An inexpensive remedy is to remove the belt, sandpaper the pulley faces slightly to roughen them and then rub beeswax on the pulley side of the belt. When the belt is replaced the slipping will have been eliminated.—W. S. Crooks.

KNOB FROM A TOOTH-PASTE CAP

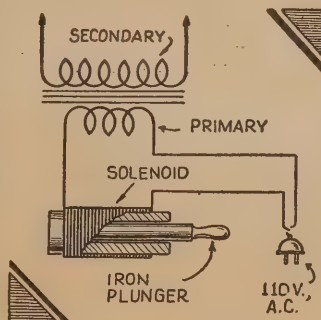
A new use for toothpaste caps is illustrated. Take the cap from a large size toothpaste tube, and a 3/16" flathead stove bolt, place the head of the stove bolt in the threaded interior of the cap. Cut off the threaded portion of the old tube of toothpaste and pass this over the stove bolt and screw it into the threads of the cap to act as a bushing to hold the bolt in place as shown in the sketch. Then take a pen-knife and force it between the bolt and the bushing, spreading the bushing to make a tight fit.

Another variation is to pour sealing wax into the cap instead of using the threaded portion of the toothpaste tube. The result is a neat knob-headed screw, which may be used in the construction of an antenna trimmer.—Alexander Johnson.

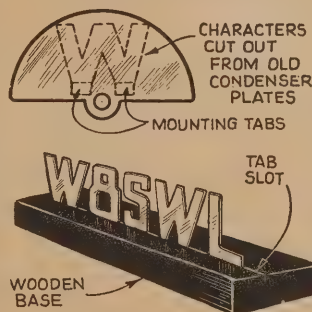


VOLTAGE REGULATOR

A simple device for regulating the primary voltage of a power transformer is shown. The unit is simply a variable inductance. Moving the iron plunger in and out of the coil varies the inductance. The coil consists of 30 turns of No. 18 D.C.C. wire, wound on a 1 1/2" dia. tube about 3" long. The plunger may be a piece of iron pipe 5" long and just large enough to fit snugly into the tube. A wooden handle is attached to the end of the pipe. This Kink, of course, will only work on A.C.—Robert F. Scott.



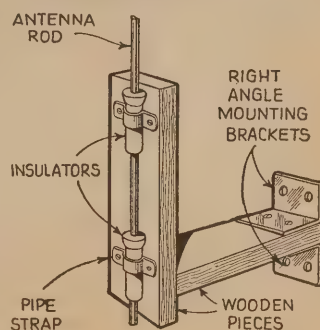
OLD CONDENSER PLATES



Old condenser plates seem to have more uses than model "T" Fords. By removing the plates from the condenser and cutting out characters with a sharp pair of metal shears, an attractive set of call letters can be made at no expense as shown in the illustration. A pair of tabs should be cut out at the bottom of each character to facilitate mounting them.

After cutting out the letters they should be hammered flat and possibly burnished to suit the user's taste. A mounting base of wood or bakelite may be used.—Milton Hawley.

ANTENNA MOUNTING

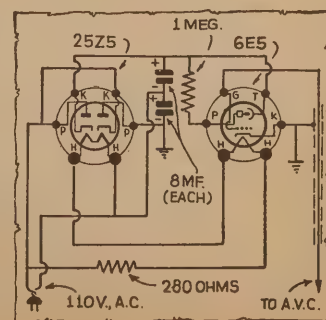


A simple mounting for a half-wave 5-meter antenna using a 5/16" dia. rod may be made from two lead-through insulators, two pipe straps, two pieces of wood and a couple of angle brackets. The sketch shows how the antenna rod is passed through the two insulators which in turn are secured to one of the boards by means of the pipe straps. The second piece of wood and the right-angle brackets are used to stand the assembly away from the wall of the shack.—Jack Lehman.

OUTPUT METER

A practical output meter making use of a "magic eye" tube is shown in the diagram. The unit is entirely self-powered and will operate from 110 Volts A.C. A 25Z5 tube is used as a voltage-doubling rectifier to supply voltage for the target and plate of the tuning indicator tube. Although a 6E5 is shown, it is quite possible to use any of the other 6.3 volt heater "magic eye" tubes.

The grid of the 6E5 is connected to the A.V.C. line of the receiver which is being aligned. To align, merely feed a signal into the set and adjust until some deflection is noted on the "magic eye." Adjust trimmers for minimum shadow on the "eye."—Clarence H. Cramer.



Let's Listen In With

Joe Miller
Winner of the 30th
S.W. Scout Trophy

We wish to reiterate here that all reports from readers are very welcome, whether used or not, and that all DXers should send in a monthly list of their DX results. Please keep in mind that sending us amateur DX lists is useless, unless the frequency of each ham is given, and also the time of day heard. This helps other DXers to know *where* and *when* to search for stations reported when data is published.

We bring up a point here which has been impressed upon us by the numerous reports we receive monthly. It is that many of our DXing readers, when reading of the DX catches reported in these columns, feel that other *dial-twisters* may be able to hear these stations, but that they themselves cannot! That is like admitting one is *licked* before one starts fighting!

We believe most beginners feel that way, when they first start *combing* the dials for DX, as we felt that way when we began, because we did not know any better!

Let us make clear that any and all of the catches reported here may be heard by any DXer, who is already equipped with a fairly good receiver, a good antenna installation, a good station list, but mainly, plenty of patient perseverance!

One simply cannot sit down at his receiver, tune for a rare station, and expect it to come through the first time, unless he be very, very lucky! One must keep at it, day after day, and eventually, if all factors, such as DX conditions, are favorable the catch may be heard. Simply because such a station is not heard the first time is no indication that it is impossible to log!

After DXing for a few months, we began to realize that there was hardly a station in the whole wide world that could not be logged, provided we kept at it long enough. Then and there we decided to go after all the rare 'uns, and made up a list of stations, arranged according to reported times on air, or schedules, and, arising early every morning, tuned for one after another, according to our time schedule.

Though just beginning, we started to hear first one, then another, of the listed catches, and before long much of our list was crossed off, and logs of these entered in our station book! A sort of elimination system, and it surely worked! A *system of DXing* is what is needed, if a DXer is really out to compile an impressive list of real DX catches. Tuning haphazardly is all right in its way, but to make out a list of good DX, and then log one after another, by systematic tuning, is like setting oneself a goal, and achieving it, something to feel proud of, indeed! Then, when ones goal is achieved, and the veris begin to come in, don't sit back and feel satisfied! Set yourself a new goal, and *keep on* with the good work! A sure way to success is to follow these mottoes of

ours, "plug at it," and "never be satisfied."

There are many more good DX receivers sold than there are *good* DXers, remember that. Success in this grand game is mainly up to yourself, provided you already have the ordinary mechanical essentials.

And now to DX:

SOUTH AFRICA

ZTJ, 9.615 mc., Johannesburg, is of course the outstanding DX event of the month. This station came on the air a few weeks ago, and when we heard ZTJ's signal strength, we were, to say the least, surprised. We gave it an R99 report, and other DXers throughout the U. S. and in Canada report it at least as loud as that, though some go us a few better, reporting ZTJ R999+++, hi! This should

● Did you hear a new station? If you have logged a new short-wave broadcast station not listed or mentioned in the "Listen In" department, or in our regular station list, be sure to write the DX Editor, c/o Short Wave & Television, and give him this information for the benefit of other listeners and readers. A postal card will do, and please give the data on the station as briefly as possible. Don't forget to mention any special musical or other identifying signals that you may note.

give all of our DX friends an idea as to how this heretofore rare catch pounds in here in North America.

ZTJ announces as "9.606 kc.," but is actually heard near 9.615 mc. The power is reported by I.D.A. to be 22 kw., certainly the most powerful African S-W broadcaster in existence. Sked is daily, except Saturday, 11:45 p.m.-12:45 a.m., E.S.T., when heard best, and daily, except Sundays, 9-11:40 a.m. On Sundays, programs begin at 7-8 a.m., ending at 11:40 a.m. According to Ashley Walcott, W6, one announcement heard said that ZTJ returns to the air again at 12 noon, but only on their 6.0975 mc. frequency.

Announcements are often given, but rarely identifications; about the only one made is just after the Reuter news bulletin at midnight, merely "*Klipheuwel station*." Programs begin and end with bugle calls, and setting-up exercise are a notable feature of each program. Bugle call at beginning is "*Reveille*," and at end of program "*Cook-house*" is played by the bugle.

Reports are asked to be sent to P.O. Box 4559, Johannesburg, South Africa, same QRA (address) as for old ZTJ.

The following DXers reported ZTJ, and we thank them for their fine data: Murray Buitekant, Ralph Gozen, Mario Bruscia, all W2, Ashley Walcott, W6, Jim Lanyon, VE5, Robert H. Budden, VE2.

NETHERLANDS INDIES

YCP, 9.12 mc., Balikpapan, Dutch Borneo, was heard lately at 5:26 a.m., with a good signal. At 5:30 a.m., PLV, 9.42 mc., Bandung, Java, was heard, then YBG, 10.43 mc., Medan, Sumatra, was heard at 5:33 a.m. Another, an unidentified Javan, we are sure, was heard near 9.20 mc., at 5:28 a.m., also. We certainly "cleaned up" that a.m.

ASIATIC REVIEW

XGOX, now on 9.80 mc., Nanking, China, is being heard again, daily 7-10 a.m. Sundays till noon. At 7:30 a.m. English news is read by a woman. This Xmtr relays XGOA's programs, XGOA being China's great 75 kw., BCB (broadcast band) station. Above data by courtesy of Ashley Walcott, W6. Harry Honda, W6, reports XGOX at 9:30 a.m. "Philco Radio," of Saigon, Indo China, has returned its 49 meter relay to the air, after several months' silence. Now the station is on 6.22 mc., operating from 4:30 or 5:30 a.m., till 9:30 a.m. daily, on same schedule as the 11.70 mc. Xmtr. Modulation has been improved considerably.

JZK, Tokio, Japan, on 15.16 mc., has been discontinued on the Overseas Broadcast; JZJ, 11.80 mc., to be used only. This latest flash from Harry Honda, W6.

MISCELLANEOUS

"Radio Martinique," located at Fort-de-France, Martinique, now on 9.69 mc., is being reported by Jim Lanyon, VE5, with a FB signal between 7:45-8:15 p.m., E.S.T. The QRA is P.O. Box 126, Fort-de-France. This is a new country, and should be verified by all DXers: A lady announces frequently; station closes down with the "*Marseillaise*." Jim also reports an Uruguayan station on 9.65 mc. relaying programs from Buenos Aires, and believes that the station is CXA8. This station heard in evening of course.

OZF, 9.517 mc., Skamlebak, Denmark, is broadcasting daily 2-4:15 p.m. towards South America and Eastern Asia, and 4:15-6:15 p.m., E.S.T., for Greenland and North America. Power is 6 kw., and station is known as "*the Danish Short-Wave Station*."

QRA is: Mail and Telegraph Dept., Technical Division, No. 32 Bernstorffsgade, Copenhagen, Denmark.

RKI, announced on 7.52 mc., is heard from 7-9:15 p.m. on 7.70 mc., in conjunction with RAN, both Xmtrs being located in Moscow.

Very little also reported of any DX value, so we'll go into the amateur bands for our news—quite a bit of it this month.

** HAM STARDUST ** AFRICA

The South Africans on 20 meters are already coming through, and on 10 meters have already come and gone.

In our 10 meter log, tuning weekends only, we've been able to enter ZS6T, ZT6AK, CN8AV, ZT6J, ZS6AJ, ZU6P, ZT2G, and ZE1JR to our African log, already having ZU6P QSL'd on 10. Also heard the latter 4 on 20. Roger Legge, W2, reports hearing ZU6P, ZT6AK, ZT2B on 10.

On 20, we have so far heard, mainly between 10:45 p.m.-12:30 a.m., E.S.T., the following: ZS3F, 14.320 mc.; ZS5M, 14.315; ZS2N, 14.01; ZS6AJ, 14.14 and 14.02; ZT5S, 14.43; ZS5AB, 14.06 and ZU6P, 14.06. Also SU1KG on 14.02.

Others reported by Ashley Walcott, W6, Jim Doyle, W9, are ZS1B, 14.065 and 14.315; ZS1AV, 14.272; ZU1T, 14.07; ZT5P, 14.27; ZS6AA, 14.33; ZS6AM, 14.08; ZS6AY, 14.315; ZT6AK, 14.06; ZT6S, 14.08; ZT6Y, 14.055, and ZU6N, 14.11. Most of these reported by Ashley, who adds that Africans on 20 have died out lately, oddly, when they are just beginning to come through in the east.

Other Africans reported are ZE1JA, 14.315, Southern Rhodesia, and FB8AH, 14.275, Madagascar, by Ashley. FB DX, OB!

W. S. Wade, W7, reports CN8MB, Morocco, 14.12, at 6:40 p.m., and has also heard ZT6Y. Roger Legge reports ZS2N.

Reported by "Reg," W6ITH, are: ZS2Z, 14.04; ZT2G, 14.07 and 14.265; ZT6Y, ZU6AF, 14.35 and 14.052. Also ZU6N, ZS6AJ and ZU6P.

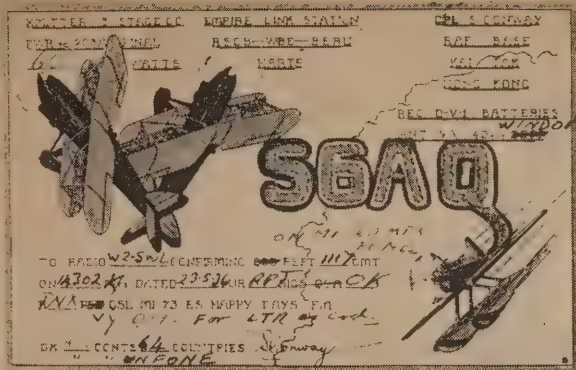
ASIA

VS1AF, 14.14, Singapore, reported by Jim Lanyon and Ashley Walcott. Also, VS1AI, 14.05, by Ashley.

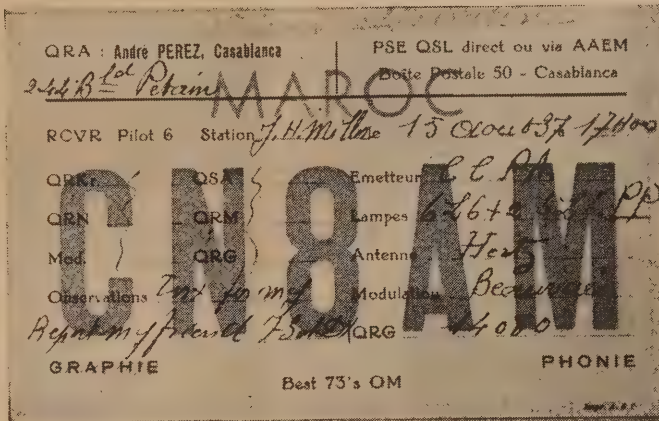
Incidentally, we regret very much having received data on a Special Broadcast from HS1BJ, Bangkok, Siam, too late for timely publication here. Sangiem Powtongsook, our Siamese radio friend and operator of HS1BJ, sent us a letter by air-mail informing us of the "Special," but he could not write us till too late, not knowing whether he would be able to put on the "Special."

Since then he has made arrangements, and we have had notice of this Special printed in the I.D.A. and I.S.W.C. bulletins, to inform as many friends as possible of this very fine "Special Broadcast."

Date of "Special" was Nov. 11-12-13-14, from 6:15-7 a.m., E. S. T., on 14.07 phone, using 25 watts power output. Zepp antenna, half-wave,



↑ Above—The interesting QSL card shown above was received from VS6AQ, Hong Kong, and it's printed in black and white.



← Left — CN8AM — French Morocco, sends out this very distinctive card; the call letters and the word Maroc are printed in brown.

beamed over North Pole to New York. Program was of native recordings, opening and closing with the national anthem.

A picture, and letter from Sangiem was printed in November issue of S.W. & T. Sangiem is Ass't. Engineer at HS8PJ, Siamese national station.

We are very grateful to Sangiem for his

and we know that he will get many FB reports with that swell layout, as W6ITH reported HS1BJ R99++ recently, in a QSO with Sangiem!

Asiatics reported by Ashley are VS6AG, 14.084; Hong Kong, XZ2DY, 14.34, Burma, and also in Burma, heard by W6ITH, are XZ2EH, 14.04; XZ2BZ, 14.33; XZ2JB, 14.152, besides XZ2DY.

FI8AC, 14.27, French Indo-China, reported by John De Myer, W8, and Ashley. Says "France-Indiana-No. 8, America-Canada," in giving call. QRA is P.O. Box 13, Hanoi, and name is R. Lebon. A very FB catch.

PK6WF, 14.08, Dutch Guinea, reported by John De Myer and Irv. Goodeve, W8, early morning.

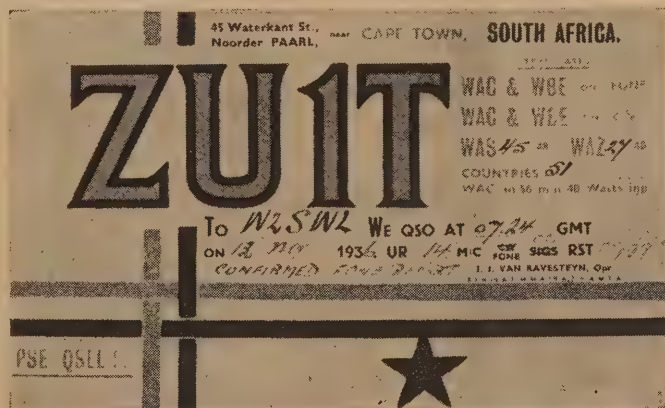
Other Asiatics, heard and QSO'd by W6ITH, are: PK1VM, 14.1; PK2WL, 14.22; J2NG, 14.06; J2MI, who will increase power from 200 to 800 watts, 14.08; PK4WS, 14.1; VS1AD, 14.245; KA1JR, 14.254; KA1MM, 14.18; KA1AP, 14.06; KA1ME, 14.15, who is building a 1 kw. Xmtr for 10 and 20 meter phone; KA1DT, 14.21; KA1HS, 14.2 and 14.24, who will have a 1 kw. Xmtr by end of year. XU8HW, 14.03, Shanghai, will be in Manila till war's over.

YS2AK, 14.26 and 14.146, Federated Malay States, also reported by W6ITH. KA1CS, 14.14; KA1YL, the Yacht Latitude, reported by Ashley.

Jim Doyle, W9, reports Y12BA, 14.35, at 12:50 a.m., also reported by W. S. Wade, W7. This is in Iraq. Jim Doyle also reports XU8HN, 14.3, PK2WL, PK4WS, XZ2BZ, PK1VM, VS2AK, VS1AI; nice DX, OB!

On 10 meters VU2CQ is reported by Chas. Baker, W2KTF, after dark. G6BH says VU2CQ is near 28.3, and that the Indian pounds in (in England).

(Continued on page 514)



↑ Above—This unusual card comes from ZU1T, in Cape Town, South Africa, and is printed in three colors—red, blue and brown. Look for this station on 20 meters.



← Left—The neat QSL card sent by station CT2AB in the Azores. This card has a center panel printed in red.

World Short-Wave Stations

**REVISED
MONTHLY**

**Up-to-the-Minute List of
Broadcasters and Phones**
Broadcasters Calls in bold type: Phones in light type
Reports on station changes are appreciated.

↓ S.W. BROADCAST BAND ↓			Mc.	Call	Mc.	Call	Mc.	Call
21.600	W3XEY	BALTIMORE, MD., 9.494 m., Relays WFBR 4 pm-12m.	19.600	LSF	BUENOS AIRES, ARG., 15.31 m., Addr. (See 20.700 mc.) Tests irregularly.	17.755	ZBW5	HONGKONG, CHINA, 16.9 m., Addr. P. O. Box 200. 4-10 am. Irregular.
21.600	W2XDV	NEW YORK CITY, 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 6-11 pm.; Sat. and Sun. 1.30-6, 7-10 pm.	19.480	GAD	RUGBY, ENG., 15.4 m. Calls VQG4 7.30-8 am.	17.741	HSP	BANGKOK, SIAM, 16.91 m. Works Germany 3-5 am., 8-9 pm. Works JVE 11 pm.-6 am.
21.600	W4XCA	MEMPHIS, TENN., 9.494 m., Addr. Memphis Commercial Appeal. Relays WMC.	19.355	FTM	ST. ASSISE, FRANCE, 15.5 m. Calls S. America mornings.	17.850	XGM	SHANGHAI, CHINA, 17 m. Works London 7-9 am.
21.600	W8XAI	ROCHESTER, N. Y., 9.494 m., Addr. Stromberg Carlson Co. Relays WHAM 7.30-12.05 am.	19.345	PMA	BANDOENG, JAVA, 15.51 m. Works Holland 5.30-11 am.	17.620	DFB	NAUEN, GERMANY, 17.12 m. Works S. America, near 9.15 am. Works Siam 3-5 am., 8-9 pm.
21.600	W8XWJ	DETROIT, MICH., 9.494 m., Addr. Evening News Ass'n. Relays WWJ 6-12.30 am., Sun. 8 am-12 m.	19.280	PPU	RIO DE JANEIRO, BRAZ., 15.58 m., Addr. Cia. Radiotel. Brasileira. Works France mornings.	17.480	VWY2	KIRKEE, INDIA, 17.16 m. Works London 7.30-8.15 am.
21.600	W9XPD	ST. LOUIS, MO., 9.494 m., Addr. Pulitzer Pub. Co. Relays KSD.	19.220	WKF	LAWRENCEVILLE, N. J., 15.6 m., Addr. A. T. & T. Co. Calls London and Paris daytime.	17.310	W2XG8	HICKSVILLE, L. I., N. Y., 17.33 m., Addr. Press Wireless, Box 296. Tests 11 am.-1 pm. except Sat. and Sun.
26.400	W9XJL	SUPERIOR, WIS., 11.36 m., Relays WEBC daily.	19.200	ORG	RUYSSELEDE, BELGIUM, 15.62 m. Calls OPL mornings.	17.120	WOO	OCEAN GATE, N. J., 17.52 m., Addr. A. T. & T. Co. Works ships irregularly.
26.400	W9XAZ	MILWAUKEE, WIS., 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.	19.160	GAP	RUGBY, ENG., 15.66 m. Calls Australia 1-8 am.	17.080	GBC	RUGBY, ENG., 17.56 m. Works ships irregularly.
26.100	GSK	DAVENTRY, ENG., 11.49 m., Addr. B. B. C., London. Operates irregularly	19.020	HS8PJ	BANGKOK, SIAM, 15.77 m. Mondays 8-10 am.	16.835	ITK	MOGADISCIO, ITAL. SOMALILAND, 18.32 m. Calls IAC around 9.30 am.
25.950	W8XKG	LOS ANGELES, CAL., 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily.	18.970	GAQ	RUGBY, ENG., 15.81 m. Calls S. Africa mornings.	16.270	WOG	LAWRENCEVILLE, N. J., 18.44 m., Addr. A. T. & T. Co. Works S. Amer. daytime.
21.650	GST	DAVENTRY, ENG., 13.92 m., Addr. (See 26.100 mc.) Irregular at present.	18.890	ZSS	KLIPHEUVEL, S. AFRICA, 15.88 m., Addr. Overseas Comm. of S. Africa, Ltd. Calls GAQ 9-10 am.	16.240	KTO	OCEAN GATE, N. J., 18.44 m., Addr. A. T. & T. Co. Works England Late afternoon.
21.640	W8XK	PITTSBURGH, PA., 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Exc. Sun.	18.830	PLE	BANDOENG, JAVA, 15.93 m. Calls Holland early am.	16.235	FZ3	SAIGON, INDO-CHINA, 18.48 m. Calls Paris early morning.
21.630	GSJ	DAVENTRY, ENG., 13.93 m., Addr. (See 26.100 mc.) 5.45-8.55 am., 9.15-10.30 am.	18.680	OCI	LIMA, PERU, 16.06 m. Tests with Bogota, Col.	16.030	KKP	KAHUKU, HAWAII, 18.71 m., Addr. RCA Comm. Works Dixon 3-10 pm.
21.520	W2XE	NEW YORK CITY, 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave. 7.30-10 am., Sat. and Sun. 8 am.-1 pm.	18.520	GAU	RUGBY, ENG., 16.11 m. Calls N. Y. daytime.	15.880	FTK	ST. ASSISE, FRANCE, 18.9 m. Works Saigon 8-11 am.
21.470	GSH	DAVENTRY, ENG., 13.97 m. (See 26.100 mc.), 5.45-8.55 am., 9.15 am.-12 n.	18.450	HBF	GENEVA, SWITZERLAND, 16.26 m., Addr. Radio Nations. Tests irregularly.	15.865	CEC	SANTIAGO, CHILE, 18.91 m. Calls Peru daytime irregular.
↑ S.W. BROADCAST BAND ↑			18.345	FZS	SAIGON, INDO-CHINA, 16.35 m. Works Paris early morning.	15.810	LSL	BUENOS AIRES, ARG., 18.98 m., Addr. (See 21.020 mc.) Works London mornings and Paris afternoons.
21.420	WKK	LAWRENCEVILLE, N. J., 14.01 m., Addr. Amer. Tel. & Tel. Co. Calls S. Amer. 7 am.-7 pm.	18.340	WLA	LAWRENCEVILLE, N. J., 16.36 m., Addr. A. T. & T. Co. Calls England daytime.	15.860	JVE	NAZAKI, JAPAN, 19.16 m. Works Java and Siam 3-5 am.
21.080	PSA	RIO DE JANEIRO, BRAZ., 14.23 m., Calls WKK daytime.	18.310	GAS	RUGBY, ENG., 16.38 m. Calls N. Y. daytime.	15.620	JVF	NAZAKI, JAPAN, 19.2 m. Works Cal. near 5 am. and 8 pm.
21.080	WKA	LAWRENCEVILLE, N. J., 14.25 m., Addr. (See 21.420 mc.) Calls England morning and afternoon.	18.295	YVR	MARACAY, VENEZ., 16.39 m. Works Germany mornings.	15.550	CO9XX	TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones? Broadcasts irregularly evenings.
21.020	LSN6	BUENOS AIRES, ARG., 14.27 m., Addr. Cia. Internacional de Radio. Works N. Y. C. 7 am.-7 pm.	18.250	FTO	ST. ASSISE, FRANCE, 16.43 m. Works S. America daytime.	15.450	IUG	ADDIS ABABA, ETHIOPIA, 19.41 m. Works Rome 9.15-10.30 am.
20.860	EHY-EDM	MADRID, SPAIN, 14.38 m., Addr. Cia. Tel. Nacional de Espana. Works S. Amer. mornings.	18.200	GAW	RUGBY, ENG., 16.48 m. Works N. Y. C. daytime.	15.440	XEBM	MAZATLAN, SIN., MEX., 19.43 m., Addr. Flores 103 Alto. "El Pregonero del Pacifico." Irregularly 7 am.-10 pm.
20.700	LSY	BUENOS AIRES, ARG., 14.49 m., Addr. Transradio Internat. Tests irregularly	18.135	PMC	BANDOENG, JAVA, 16.54 m. Works Holland mornings.	15.415	KWO	DIXON, CAL., 19.46 m., Addr. A. T. & T. Co. Works Hawaii 2-7 pm.
20.380	GAA	RUGBY, ENG., 14.72 m. Calls Arg., Brazil mornings.	18.115	LSY3	BUENOS AIRES, ARG., 16.56 m., Addr. (See 20.700 mc.) Tests irregularly. Broadcasts 4-5 pm. Friday.	15.370	HAS3	BUDAPEST, HUNGARY, 19.52 m., Addr. Radiolabor, Gyalai Ut 22. Sun 9-10 am.
20.040	OPL	LEOPOLDVILLE, BELGIAN CONGO, 14.97 m. Works ORG mornings.	18.040	GAB	RUGBY, ENG., 16.83 m. Works Canada morning and afternoon.	15.360	DZ6	ZEESEN, GERMANY, 19.53 m., Addr. Reichspostzentralamt. Tests irregularly.
20.020	DHO	NAUEN, GERMANY, 14.99 m., Addr. Reichspostzentralamt. Works S. Am. mornings.	17.810	PCV	KOOTWIJK, HOLLAND, 16.84 m. Works Java 6-8 am.	15.355	KWU	DIXON, CALIF., 19.53 m., Addr. A. T. & T. Co. Phones Pacific Isles and Japan
19.900	LSG	BUENOS AIRES, ARG., 15.08 m., Addr. (See 20.700 mc.) Tests irregularly.	↓ S.W. BROADCAST BAND ↓			15.340	DJR	BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 8-9 am.
19.820	WKN	LAWRENCEVILLE, N. J., 15.14 m., Addr. A. T. & T. Co. Calls England daytime.	17.800	TGWA	GUATEMALA CITY, GUAT., 16.84 m., Addr. Ministre De Fomento. Irregular.	15.330	W2XAD	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY 11 am. to 9 pm.
19.680	CEC	SANTIAGO, CHILE, 15.24 m., Addr. Cia. Internacional de Radio. Calls Col. and Arg. daytime.	17.790	GS6	DAVENTRY, ENG., 16.86 m., Addr. B. B. C., London. 3.15-5.30 am., 5.45-8.55 am., 9 am.-12 n., 12.20-3.45 pm.	15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 26.100 mc.) 1.45-3.45 pm.
19.650	LSN5	BUENOS AIRES, ARG., 15.27 m., Addr. (See 21.020 mc.) Calls Europe daytime	17.785	JZL	TOKIO, JAPAN, 16.87 m. Tests irregularly.	15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. 6-8 am.
19.620	VQG4	NAIROBI, KENYA, 15.28 m., Addr. Cable and Wireless, Ltd. Calls London 7.30-8 am.	17.780	W3XAL	BOUND BROOK, N. J., 16.87 m., Addr. Natl. Broad. Co. 9 am.-9 pm.	↑ S.W. BROADCAST BAND ↑		
			17.770	PHI	HUIZEN, HOLLAND, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily except Wednesday, 8.25-10 am., Sat. till 10.40 am., Sun. 7.25-10.25 am. Wed. 8-10.30 am.	(Continued on page 492)		
			17.760	DJE	BERLIN, GERMANY, 16.89 m., Addr. Broadcasting House. 12.05-11 am.; also Sun. 11.10 am.-12.25 pm.			
			17.760	W2XE	NEW YORK, N. Y., 16.89 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 6.30-8 pm.			

(All Schedules Eastern Standard Time)

QUESTION BOX

INPUT FROM TRIODE DETECTOR

0.01-MF

76

50,000 OHMS

0.01-MF

12A7

0.25-MEG

1 MF

2,500 OHMS

5 MF

150 PF

1,500 OHMS

330 OHMS (LINE CORD)

110V. A.C.-D.C.

SW

VOICE COIL

OUTPUT TRANS.

CH. 15H

15 MF (EACH)

EXTERNAL GROUND

fier, a 36 as regenerative detector, a 37 as audio, and a 5Z4 as rectifier. This set should give good headphone reception and operates from a 110 Volts A.C. line. More modern tubes may be substituted in the R.F. and detector stages should the constructor so desire. For example, 6C6's can be substituted for the 36's with no changes other than tying their suppressors to the cathodes, and in the case of the R.F. amplifier, replacing the 100,000 ohm screen-grid resistor with one having a value of 300,000 ohms. In addition, a type 76 tube may be substituted for the 37.

a plate supply of less than 200 volts is used, the resistor from the target to the plate of the cathode ray tube should be reduced in value to 0.5 meg. The 2 meg. resistor and the .02 mf. condenser in the grid circuit of the tube determine the rapidity of the action of the eye in responding to variations in carrier strength. Increasing the value of the resistor and the condenser will make the eye action more sluggish. Similarly, decreasing the value of these two parts will make the device respond to very rapid impulses and, in fact, if they are made too small, the eye will change for variations in modulation which is undesirable in a receiver. It is necessary that the receiver employ A.V.C. to make use of one of these tubes. A 6G5 tube may be substituted for the 6E5 tube. To determine which tube is proper tune in a strong signal. If the shadow edges overlap when using a 6E5, replace it with the 6G5 type.

A.C. Operated 4 Tube Receiver.—1106

Mc.	Call		FNo.	Call		Mc.	Call	
15.280	H13X	CIUDAD TRUJILLO, D. R., 19.63 m. Relays HIX Sun. 7.40-10.40 am. Week-days 12.10-1.10 pm.	14.530	LSN	BUENOS AIRES, ARG., 20.65 m., Addr. (See 20.020 mc.) Works N. Y. C. afternoons.	12.215	TYA	PARIS, FRANCE, 24.56 m. Works French ships in morning and afternoon.
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.45 pm. Also Sun. 11.10 am.-12.25 pm.	14.500	—	ASMARA, ERITREA, AFRICA, 20.69 m. Works Rome and Addis Ababa 6.30-7.30 am.	12.150	GBS	RUGBY, ENG., 24.69 m. Works N. Y. C. evenings.
15.270	W2XE	NEW YORK CITY, 19.65 m., Addr. (See 21.520 mc.) 1-6 pm., 8.30-12 m., Sat. and Sun. 2.30-6, 8.30 pm.-12 m.	15.500	LSM2	BUENOS AIRES, ARG., 20.69 m., Addr. (See 21.020 mc.) Works RIO and Europe daytime.	12.130	DZE	ZEESSEN, GERMANY, 24.73 m., Addr. (See 15.360 mc.) Tests irregular.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 26.100 mc.) 12.20-3.45 pm.	14.485	TIR	CARTAGO, COSTA RICA, 20.71 m. Works Central America and U. S. A. daytime.	12.120	TPZ2	ALGIERS, ALGERIA, 24.75 m. Calls Paris 12 m.-6.30 am.
15.252	RIM	TACHKENT, U.S.S.R., 19.67 m. Works RKI near 7 am.	14.485	YSL	SAN SALVADOR, SALVADOR, 20.71 m. Irregular.	12.060	PDV	KOOTWIJK, HOLLAND, 24.88 m. Tests irregularly.
15.250	W1XAL	BOSTON, MASS., 19.67 m., Addr. University Club. Daily 2.15-4 pm., Sun. 10.15 am.-12 n.	14.485	HPF	PANAMA CITY, PANAMA, 20.71 m. Works WNC daytime.	12.000	RNE	MOSCOW, U.S.S.R., 25 m. Daily except Sun. 3-6 pm., Sat., Sun., Tues., Fri., 10.15-10.45 pm., also Sun. 6-11 am., Wed. 6-7 am.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 bis. Blvd. Haussmann. "Radio Colonial." 6-11 am.	14.485	TGF	GUATEMALA CITY, GUATEMALA, 20.71 m. Works WNC daytime.	11.991	FZS2	SAIGON, INDO-CHINA, 25.02 m. Phones Paris mornings.
15.230	HS8PJ	BANGKOK, SIAM, 19.32 m. Irregularly Mon. 8-10 am.	14.485	YNA	NICARAGUA, MANAGUA, 20.71 m. Works WNC daytime.	11.960	H12X	CIUDAD TRUJILLO, D. R., 25.08 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm.
15.230	OLR5A	PRAGUE, CZECHOSLOVAKIA, 19.32 m., Irregular.	14.485	HRL5	NACAOME, HONDURAS, 20.71 m. Works WNC daytime.	11.955	IUC	ADDIS ABABA, ETHIOPIA, 25.09 m. Works IAC around 12 midnight.
15.220	PCJ	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio, Hilversum. Tues. 4-6.30 am., Wed. 8-10.30 am.	14.485	HRF	TEGUCIGALPA, HONDURAS, 20.71 m. Works WNC daytime.	11.950	KKQ	BOLINAS, CALIF., 25.21 m. Tests irregularly evenings.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 9 am.-7 pm.	14.470	WMF	LAWRENCEVILLE, N. J., 20.73 m., Addr. A. T. & T. Co. Works London and Paris daytime.	11.940	FTA	STE. ASSISE, FRANCE, 25.13 m. Works Morocco mornings and Argentina late afternoon.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 12.05-11 am. Also Sun. 11.10 am. to 12.25 pm.	14.460	DZH	ZEESSEN, GERMANY, 20.75 m., Addr. (See 15.360 mc.) Irregular.	↓ S.W. BROADCAST BAND ↓		
15.190	ZBW4	HONGKONG, CHINA, 19.75 m., Addr. P. O. Box 200. 11.30 pm. to 1.15 am., 4-10 am. Sat. 9.15 pm.-1 am. Sun. 3-9.30 am.	14.440	GBW	RUGBY, ENG., 20.78 m. Works U. S. A. afternoons.			
15.180	GSO	DAVENTRY, ENG., 19.76 m., Addr. (See 26.100 mc.) 3.15-5.30, 5.45-8.55 am., 4-6 pm.	14.200	EA9AH	TETUAN, SPANISH MOROCCO, 21.13 m. Daily except Sun. 2.15-5.7 and 9 pm.	11.910	CB1190	VALDIVIA, CHILE, 25.2 m., P. O. Box 642. Relays CB69 11 am.-11 pm.
15.165	XEWV	MEXICO CITY, MEXICO, 19.78 m. 12 n.-6 pm.	14.164	PI1J	DORDRECHT, HOLLAND, 20.52 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.	11.900	XEWI	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Tues. and Thurs. 7.30 pm.-12 m., Fri. 9 pm.-12 m. Sunday 12.30-2 pm.
15.160	JZK	TOKIO, JAPAN, 19.79 m., 12.30-1.30, 8-9 am.	13.990	GBA	RUGBY, ENG., 21.44 m., Works Buenos Aires late afternoon.	11.895	HP5I	AQUADULCE, PANAMA, 25.22 m. Addr. La Voz del Interior. 7.30-9.30 pm.
15.150	YDO	BANDOENG, JAVA, 19.8 m., Addr. N. I. R. O. M. 6-7.30 pm., 10.30 pm.-2 am., Sat. 7.30 pm.-2 am., 5.30-10.30 am.	13.820	SUZ	ABOU ZABAL, EGYPT, 21.71 m. Works with Europe 11 am. to 2 pm.	11.880	TPA3	PARIS, FRANCE, 25.23 m., Addr. (See 15.245 mc.) 2-5 am., 12.15-6 pm.
15.140	Q8F	DAVENTRY, ENG., 19.82 m., Addr. (See 26.100 mc.) 9.15 am.-12 n.	13.690	KKZ	BOLINAS, CALIF., 21.91 m., Addr. RCA Communications. Irregular.	11.870	W8XK	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 7-10 pm.
15.120	HVJ	VATICAN CITY, 19.83 m., 10.30-10.45 am., except Sun., Sat. 10-10.45 am.	13.635	SPW	WARSAW, POLAND, 22 m., Mon., Wed. Fri. 12.30-1.30 pm., Daily 6-7 pm.	11.860	YDB	SOERABAJA, JAVA, 25.29 m., Addr. N. I. R. O. M. Sat. 7.30 pm. to 2.30 am., daily 10.30 pm. to 2 am.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12 m.-2, 8-9 am., 10.40 am. to 4.30 pm. Sun. also 6-8 am.	13.585	GBB	RUGBY, ENG., 22.08 m. Works Egypt and Canada afternoon.	11.850	QSE	DAVENTRY, ENG., 25.29 m., Addr. (See 26.100 mc.) Irregular.
↓ S.W. BROADCAST BAND ↓			13.415	GCJ	RUGBY, ENG., 22.36 m. Works Japan and China early morning.	11.855	DJP	BERLIN, GERMANY, 25.31 m., Addr. (See 15.280 mc.) Irregular 11.35 am. to 4, 7-10.45 pm.
			13.410	YSJ	SAN SALVADOR, SALVADOR, 22.37 m. Works WNC daytime.	11.840	KZRM	MANILA, P. I., 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.
15.055	WNC	HIALEAH, FLORIDA, 19.92 m., Addr. A. T. & T. Co. Calls Central America daytime.	13.390	WMA	LAWRENCEVILLE, N. J., 22.4 m., Addr. A. T. & T. Co. Works England morning and afternoon.	11.840	CSW	LISBON, PORT., 25.35 m. Nat'l Broad. Stat. 11.30 am.-1.30 pm. Irreg.
15.038	RKI	MOSCOW, U.S.S.R., 19.95 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm.	13.380	IDU	ASMARA, ERITREA, AFRICA, 22.42 m. Works Rome daytime.	11.840	OLR4A	PRAGUE, CZECHOSLOVAKIA, 25.35 m. Addr. Czech Shortwave Sta., Praha X11, Fochova 16. Mon. and Thurs. 7-9.10 pm.
14.980	KAY	MANILA, P. I., 20.03 m., Addr. RCA Comm. Works Pacific Islands.	13.345	YVQ	MARACAY, VENEZUELA, 22.48 m. Works WNC daytime.	11.830	W9XAA	CHICAGO, ILL., 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
14.970	LZA	SOPHIA, BULGARIA, 20.04 m., Addr. Radio Garata. Sun. 12.30-8 am., 10 am.-4.30 pm. Daily 5-6.30 am., 12 n.-2.45 pm.	13.285	CGA3	DRUMMONDVILLE, QUE., CAN., 22.58 m. Works London and ships afternoons.	11.830	W2XE	NEW YORK CITY, 25.36 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C.
14.960	P8F	RIO DE JANEIRO, BRAZIL, 20.43 m. Works with Buenos Aires daytime.	13.330	IRJ	ROME, ITALY, 22.69 m. Works Tokio 5-9 am. Irregularly.	11.825	XEBR	HERMOSILLA, SON., MEX., 25.38 m. Addr. Box 68. Relays XEBH. 2-4 pm., 9 pm.-12 m.
14.950	HJB	BOGOTA, COL., 20.07 m. Calls WNC daytime.	13.075	VPD	SUVA, FIJI ISLANDS, 22.94 m. Irregularly.	11.820	QBN	DAVENTRY, ENG., 25.38 m., Addr. (See 26.100 mc.) Irregular.
14.940	H1I	CIUDAD TRUJILLO, D. R., 20.08 m., Phones WNC daytime.	12.940	WOO	OCEAN GATE, N. J., 23.36 m., Addr. A. T. & T. Co. Works with ships irregularly.	11.810	ZRO	ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 6.43-10.30 am., 11.30 am.-12.20 pm., Sun. 6.43-9 am., 11.30 am.-12.20 pm.
14.940	HJA3	BARRANQUILLA, COL., 20.08 m. Works WNC daytime.	12.825	CNR	RABAT, MOROCCO, 23.39 m., Addr. Director General Tele. & Teleg. Stations. Works with Paris irregularly.	11.805	DZG	SKAMLEBOAEK, DENMARK, 25.41 m. Addr. Statsradiofonien. Irregular.
14.945	OCJ2	LIMA, PERU, 20.21 m. Works South American stations daytime.	12.800	IAC	PISA, ITALY, 23.45 m. Works Italian ships mornings.	11.800	JZJ	TOKIO, JAPAN, 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 8-9 am., 3-4, 4.30-5.30 pm.
14.790	ROU	OMSK, SIBERIA, U.S.S.R., 20.28 m. Works Moscow irregularly 7-9 am.	12.780	GBC	RUGBY, ENG., 23.47. Works ships irregularly.	11.800	OER3	VIENNA, AUSTRIA, 25.42 m. Daily 10 am.-5 pm. Sat. until 5.30 pm.
14.730	IQA	ROME, ITALY, 20.37 m. Tests irregularly.	12.485	HIN	CIUDAD TRUJILLO, D. R., 24 m. "Broadcasting National." 12 n.-2 pm. 6-11 pm. approx.	11.795	DJO	BERLIN, GERMANY, 25.43 m., Addr. (See 15.280 mc.) Irregular.
14.653	GBL	RUGBY, ENG., 20.47 m. Works JVH1-7 am.	12.325	DAF	NORDDEICH, GERMANY, 24.34 m. Works German ships daytime.	11.795	OAX5B	ICA, PERU, 25.43 m., Addr. Radio Universal. 11 am.-12 n., 4-11.15 pm.
14.640	TYF	PARIS, FRANCE, 20.49 m. Works Saigon and Cairo 3-7 am., 12 m.-2.30 pm.	12.300	CB615	SANTIAGO, CHILE, 24.39 m., Addr. Louis Desmaras, Casilla, 761. 11 am.-1 pm., 4-8 pm., Sun. 4-10 pm.	11.790	COBF	MATANZAS, CUBA, 25.45 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6-11 pm.
14.600	JVH	NAZAKI, JAPAN, 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.	12.290	GBU	RUGBY, ENG., 24.41 m. Works N. Y. C. evenings.	(Continued on page 494)		
14.590	WMN	LAWRENCEVILLE, N. J., 20.56 m., Addr. A. T. & T. Co. Works England morning and afternoon.	12.250	TYB	PARIS, FRANCE, 24.49 m. Irregular.			
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m., Addr. Radio Nations. Broadcasts Sat. 6.45-8 pm.	12.235	TFJ	REYKJAVIK, ICELAND, 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.			

(All Schedules Eastern Standard Time)

How To Identify S-W Stations

Keep These Lists for Future Reference

WORLD-WIDE STATION IDENTIFICATION LIST

Part Seven

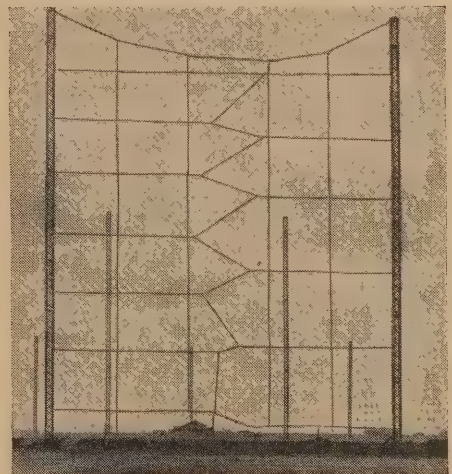
MC CALL TYPE LOCATION

- 8.664 COJK B—Camaguey, Cuba. Relays BCB CMJK. Slogan sounds like "Radio Senije."
- 8.59 YNPR B—Managua, Nicaragua. Slogan "Radioemisora Pilot," or "la voz de Pilot."
- 8.505 YNLG B—Managua, Nicaragua. Slogan "Nicaragua Patria de Dario," as station owned by Rueben Dario.
- 8.38 IAC C—Coltano, Italy. Often calls ships in afternoons, calling "Pronto Pronto Roma," etc.
- 8.33 HC2CW B—Guayaquil, Ecuador. Slogan "Ondas del Pacifico," opens and closes with musical selection "Sangre Ecuatoriana."
- 8.12 KTP C—Manila, Philippines. Call at opening and end of phone transmissions, "This is station KTP, Manila, on a frequency of 8120 KC, now—" Inverted speech used all other times.
- 7.86 SUX C—Cairo, Egypt. Calls Rome and London in afternoons, "Hello London, SUX Cairo, calling." Inverted speech used except at opening and close of transmission.
- 7.855 KZGF C—Manila, Philippines. Call given in code before most transmissions. Inverted speech ordinarily used. At start of transmission may change back and forth between 6.46, 5.81 and 7.855 mc.
- 7.854 HC2JSB B—Guayaquil, Ecuador. Slogan "Ecuador Radio." Standby signal one deep-toned chime or gong.
- 7.83 KZGG C—Cebu Island, Philippines. Call given in code before most transmissions. "Hello Manila, Cebu calling." Inverted speech always used. Contacts KZGF.
- 7.797 HBP B—Geneva, Switzerland. Slogan "Radio Nations." Call and wavelength announced, and then "League of Nations Wireless Station." A different language is used every 15 minutes of the broadcast.
- 7.68 YBZ C—Menado, Celebes, N.E.I. Call in Dutch at beginning of transmission only "Hallo Macassar, hier ist Menado." Inverted speech never used.
- 7.66. JKJ C—Yoshino, near Kagoshima, Japan. Clear phone transmission heard only at beginning of first transmission on this frequency. Inverted speech always used at other times.
- 7.61 KWX C—Dixon, California. Identifies in clear speech at beginning and end of transmission. Inverted speech used.
- 7.565 KWK C—Dixon, California. (See KWX.)
- 7.56 YNLF B—Managua, Nicaragua. Slogan "La voz de Nicaragua."
- 7.55 TI8WS B—Puntarenas, Costa Rica. Slogan "Ecos del Pacifico."
- 7.54 RKI B—Moscow, U.S.S.R. Transmits simultaneously with RAN, on evening program only. See RAN, 9.60 mc. Occasionally phones RIM, 7.63 mc., Tashkent, late a.m.'s using clear speech.
- 7.47 JVQ C—Nazaki, Japan. Identifies in Japanese at start of phone transmissions. Inverted speech used.
- 7.39 ZLT2 C—Wellington, New Zealand (See ZLT4 11.05 mc.)
- 7.38 XECR B—Mexico City, Mexico. Slogan "The Voice of Mexico."
- 7.36 XGV C—Shanghai, China. Call in English at beginning and end of transmission, "This is station XGV, Shanghai, on a frequency of 7360 kc., —." Inverted speech. This frequency rarely used.
- 7.315 YNLAT B—Granada, Nicaragua. "La voz del Mombacha." Uses call YN2LT when phoning other amateurs.
- 7.20 YNAM B—Managua, Nicaragua. "La voz del Pacifico." Signs off with the Washington Post March.
- 7.177 CR6AA B—Lobito, Angola. (See CR6AA, 9.66 mc.)
- 7.10 FO8AA B—Papeete, Tahiti. Slogan "Radio Club Oceanic." Comes on with "La Marseillaise," goes off usually with "Aloha Oe." Call given at beginning and end of program.
- 7.00 EA9AH B—Tetuan, Spanish Morocco. Uses slogans "Viva Franco," "Voice of the Trenches."
- 6.98 KZGG C—Cebu, Philippines. (See KZGG, 7.83 mc.)
- 6.97 HCETC B—Quito, Ecuador. Slogan "Radio Teatro."
- 6.90 HI2D B—Trujillo City, Dominican Republic. Slogan "la voz de L'Asociacion Catolica."
- 6.805 HI7P B—Trujillo City, D. R. "Emisora del Comercio."
- 6.80 PZH B—Paramaribo, Dutch Guiana. Announcements in Dutch and Spanish, occasionally English.
- 6.775 HIH B—San Pedro de Macoris, D.R. Slogan "la voz del Higuamo."
- 6.75 JVT B—Nazaki, Japan. (See JVN, 10.66 mc.)
- 6.73 HI3C B—La Romana, D. R. Slogan "la voz de la Feria."
- 6.72 PMH B—Bandoeng, Java. (See YDC, 15.15 mc.)

New Danish High-Power S-W Station



● Since September 6th, 1937, the old short-wave transmitter (OXY, 6060 kc., 0.5 kw.) has been replaced by a new 6 kw., transmitter. Crystal control of the carrier frequency is used, with separate master oscillator units for each operating frequency. The total number of stages is 8, screen-grid tubes are employed in the low-power stages and two 15 kw., water-cooled triodes in push-pull in the last stage. Lower-power modulation is employed and occurs in the plate circuit of stage No. 6. All the supplies for the transmitter, including 10,000 volts for the last stage, are taken from motor-generators. For the transmissions towards North America and Greenland a directional antenna of the diamond type is employed. The directional antennas for transmissions to South America and East Asia consist of systems of horizontal dipoles. The photograph shows the aerials for 11805 kc. (CZG) and 9520 kc. (OZF) suspended between two 100 meter wood masts. For schedules see world Station List, page 490.



Can YOU Answer These Radio Questions?

- How does a person in New York City call a radio patrol car? See page 469.
- Class attention! What modern radio device is used to record brain waves? See page 471.
- Is the heating effect the only result of short-wave diathermy? See page 472.
- How can radio waves detect the presence of metallic ore? See page 474.
- What is the effect of reversed feedback in the audio output circuit? See page 477.
- What is the number of the new 1 1/2 volt dry-cell radio tube? See page 480.
- Can you explain how to make a simple output meter, using the new "magic eye" tube? See page 487.
- Where is station YCP, and what is its time schedule? See page 488.
- Can you draw a diagram showing how to connect a 6E5 cathode-ray tuning eye to a receiver? See page 491.
- What is a "folded doublet" and can it be used for transmitting? See page 499.
- Where is the short-wave broadcast station SPD located? See page 494.
- How is television used in new adv. sign? See page 525.

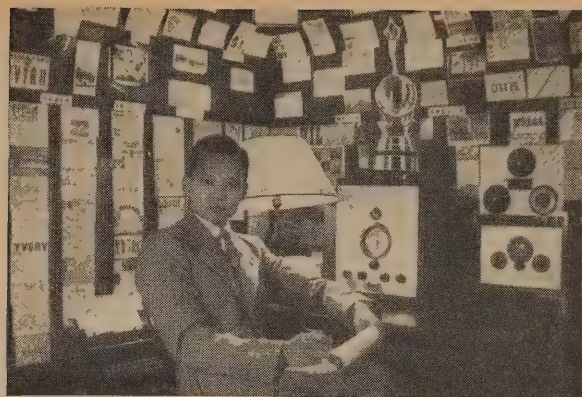
Mc.	Call		Mc.	Call		Mc.	Call	
11.790	W1XAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) Daily 4.45-6.30 pm., Sat. 1.45-5.15, 6-6.30 pm., Sun. 3-6.30 pm.	10.650	WOK	LAWRENCEVILLE, N. J., 28.44 m., Addr. A. T. & T. Co. Works S. A. nights.	9.800	LSI	BUENOS AIRES, ARG., 30.61 m., Addr. (See 10.350 mc.) Tests irregularly.
11.770	DJD	BERLIN, GERMANY, 25.49 m., Addr. (See 15.280 mc.) 10.40 am.-4.30 pm., 4.50-11 pm.	10.535	JIB	TAIHOKU, TAIWAN, 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9-10.25 am. 1-2.30 am. Sun. to 10.15 am.	9.790	GCW	RUGBY, ENGLAND, 30.64 m. Works N. Y. C. evenings.
11.760	TGWA	GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Tues. and Thurs. 8 pm.-12 m.	10.520	VLK	SYDNEY, AUSTRALIA, 28.51 m., Addr. Amalgamated Wireless of Australasia Ltd. Works England 1-6 am.	9.775	COCM	HAVANA, CUBA, 30.69 m. Addr. Transradio Columbia, P. O. Box 33. 7 am.-12 m. Relays CMCM.
11.760	OLR4B	PRAQUE, CZECHOSLOVAKIA, 25.51 m., Addr. (See 11.875 mc.) Irregular.	10.430	YBG	MEDAN, SUMATRA, 28.76 m. 5.30-6.30 am., 7.30-8.30 pm.	9.760	VLJ-VLZ2	SYDNEY, AUSTRALIA, 30.74 m., Addr. Amalgamated Wireless of Australasia Ltd. Works Java and New Zealand early morning.
11.750	QSD	DAVENTRY, ENG., 25.53 m., Addr. B. B.C., London. 3.15-5.30, 10.30 am.-12 n., 12.20-6.00 pm., 6.20-8.30, 9-11 pm.	10.420	XGW	SHANGHAI, CHINA, 28.79 m. Works Japan 12 m.-3 am.	9.750	WOF	LAWRENCEVILLE, N. J., 30.77 m., Addr. A. T. & T. Co. Works London and Paris night time.
11.730	—	SAIGON, INDO CHINA, 25.57 m., Addr. Radio Philco. 11pm.-1am., 5.30-9.30am.	10.410	PKD	KOOTWIJK, HOLLAND, 28.8 m. Works Java 7.30-9.40 am.	9.740	COCQ	HAVANA, CUBA, 30.78 m. Addr. 25 No. 445, Vedado, Havana. 6.55 am.-1 am. Sun. till 12 m.
11.730	PHI	HUIZEN, HOLLAND, 25.57 m., Addr. N. V. Philips' Radio.	10.410	KES	BOLINAS, CALIF., 28.8 m., Addr. RCA Communications. Irregular.	9.710	GCA	RUGBY, ENGLAND, 30.89 m. Works S. A. evenings.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. 4-10pm.	10.370	JVO	NAZAKI, JAPAN, 28.93 m. Broadcasts around 5 am.	9.700	FZF6	FORT DE FRANCE, MARTINIQUE, 30.9 m., Addr. P. O. Box 136. 11.30 am.-12.30 pm., 6.15-7.50 pm.
11.718	CR7BH	LAURENCO MARQUES, PORTUGUESE, E. AFRICA, 25.6 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.	10.370	EHZ	TENERIFFE, CANARY ISLANDS, 28.93 m., Relays EAJ43 2.15-3.15, 6.15-8.55 pm. Relays Salamanca, Spain 8.55-10 pm.	9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Irregular.
11.715	TPA4	PARIS, FRANCE, 25.61 m., (See 15.245 mc.) 6.15-8.15 pm., 10 pm.-1 am.	10.350	LSX	BUENOS AIRES, ARG., 28.98 m., Addr. Transradio International. Broadcasts 5-6 pm. Mon. and Fri. Tests irregularly at other times.	9.675	DZA	ZEESSEN, GERMANY, 31.01 m., Addr. (See 10.042 mc.) Irregular.
11.710	SBQ	MOTALA, SWEDEN, 25.63 m., 1.20-2.05, 8-9 am., 11 am.-1.30 pm.	10.330	ORK	RUYSSELEDE, BELGIUM, 29.04 m. 2.30-4 pm.	9.670	TIANRH	HEREDIA, COSTA RICA, 31.02 m., Addr. Amando C. Marin, Apartado 40. 8.30-10 pm., 11.30 pm.-12 m.
11.710	XEWB	GUADALAJARA, MEX., 25.63 m., Addr. Juarez 289. Irregular.	10.300	LSL2	BUENOS AIRES, ARG., 29.13 m., Addr. Cia. Internacional de Radio. Works Europe evenings.	9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. 8.30 am.-10.30 pm.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.63 m., Addr. (See 7.894 mc.) Irregular 1.30-2.30 pm.	10.290	DZC	ZEESSEN, GERMANY, 29.16 m., Addr. (See 15.360 mc.) Irregular.	9.650	CT1AA	LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4.30-7 pm.
11.700	HP5A	PANAMA CITY, Pan., 25.65 m. Addr. Radio Teatro, Apartado 954. 10 am.-10 pm.	10.260	PMN	BANDOENG, JAVA, 29.24 m., Relays YDB 5.30-10.30 or 11 am., Sat. to 11.30 am.	9.650	DGU	NAUEN, GERMANY, 31.09 m., Addr. (See 20.020 mc.) Works Egypt afternoons.
11.700	CB1170	SANTIAGO, CHILE, 25.65 m., Relays CB89 6 pm.-12 m.	10.250	LSK3	BUENOS AIRES, ARG., 29.27 m., Addr. (See 10.310 mc.) Works Europe and U.S.A. afternoons and evenings.	9.645	HH3W	PORT-AU-PRINCE, HAITI, 31.1 m., Addr. P. O. Box A117. 1-2, 7-8 pm.
↑ S.W. BROADCAST BAND ↓			10.250	CED	ANTOFAGASTAN, CHILE, 29.33 m. Tests 7-9.30 pm.	9.645	YNLF	MANAGUA, NICARAGUA, 31.1 m. 8-9 am., 12.30-2.30, 6.30-10 pm.
11.680	KIO	KAHUKU, HAWAII, 25.68 m., Addr. RCA Communications. Irregularly.	10.230	PSH	RIO DE JANEIRO, BRAZIL, 29.35 m. Irregular.	9.640	CXA8	COLONIA, URUGUAY, 31.1 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LRS, Buenos Aires 6 am.-11 pm.
11.695	VRR4	STONY HILL, JAMAICA, B. W. I., 25.87 m. Works WNC daytime.	10.220	RIO	BAKOU, U.S.S.R., 29.15 m. Works Moscow 10 pm.-5 am.	9.635	ZRO	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) Daily 12.30-5.30, 6-7.45 pm.
11.580	VIZ3	FISKVILLE, AUSTRALIA, 25.95 m., Addr. Amalgamated Wireless of Australasia Ltd. Tests irregularly.	10.170	OPM	LEOPOLDVILLE, BELGIAN CONGO, 29.59 m. Works Belgium around 3 am. and from 1-4 pm.	9.630	HJ7ABD	BUARAMANGA, COL., 31.14 m. 10 am.-12 n., 4-11 pm.
11.530	SPD	WARSAW, POLAND, 26 m., Addr. 5 Mazowiecka St. Testing daily 6-7 pm.	10.140	RIO	TIFLIS, U.S.S.R., 29.76 m. Works Moscow early morning.	9.625	—	TAIHOKU, TAIWAN, 31.16 m. Relays JFAK irreg. 8-10.25 am., 1-2.30 am., Sun. 8-10.15 am.
11.500	XAM	MERIDA, YUCATAN, 26.09 m. Irregular 1-7.30 pm.	10.080	RIO	MADRID, SPAIN, 29.79 m. Works S. A. evenings.	9.620	HJ1ABP	CARTAGENA, COL., 31.19 m., Addr. P. O. Box 37. 11 am.-1 pm., 5-11 pm. Sun. 10 am.-1 pm., 3-6 pm.
11.500	PMK	BANDOENG, JAVA, 26.09 m. Tests irregularly.	10.070	EDM-EHY	SHINKYO, MANCHUKUO, 29.81 m. Works Tokio 6.30-7 am.	9.615	—	KLIPHEUVAL, SOUTH AFRICA, 31.19 m., Addr. P. O. Box 4559, Johannesburg. Relays Johannesburg and Cape Town Daily, exc. Sat. 11:45 pm.-12:40 am., Daily exc. Sun. 9-11:40 am., Sun 8-10:15 am.
11.450	COCX	HAVANA, CUBA, 26.17 m. P. O. Box 32. 6.55 am.-1 am. Sun. till 12 m. Relays CMX.	10.065	JZB-TDB	HAMILTON, BERMUDA, 29.84 m. Works N. Y. C. irregular.	9.615	HP5J	PANAMA CITY, PANAMA, 31.22 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.
11.413	CJA4	DRUMMONDVILLE, QUE., CAN., 26.28 m. Tests irregularly.	10.055	ZFB	ABOU ZABAL, EGYPT, 29.84 m. Works Europe 1-6 pm.	9.610	JZI	TOKIO, JAPAN, 31.23 m., Addr. (See 11.800, JZJ) 3-4 pm.
11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Sat. 6.45-8 pm.	10.055	SUV	ZEESSEN, GERMANY, 29.87 m., Addr. Reichspostzentralamt. Irregular.	↓ S.W. BROADCAST BAND ↓		
11.290	HIN	CIUDAD TRUJILLO, D. R., 26 m., Addr. La Voz del Partido Dominicano. Irregular.	10.042	DZB	MANILA, P. I., 30.03 m., Addr. RCA Communications. Works Java early morning.	9.600	RAN	MOSCOW, U.S.S.R., 31.25 m. Daily 7-9.15 pm.
11.050	ZLT4	WELLINGTON, NEW ZEALAND, 27.15 m. Works Australia and England early morning.	9.990	KAZ	HAVANA, CUBA, 30.15 m., Addr. (See 6.590 mc., COCU). Relays CMCU 7 am.-12 m.	9.595	HBL	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Sat. 5.30-6.30 pm.
11.040	CSW	LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broadcasting Sta. 1.30-5 pm.	9.950	COCU	RUGBY, ENGLAND, 30.15 m. Works N. Y. C. night time.	9.590	PEJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7-9 pm. Tues. 1-3.30, 7-9.30 pm. Wed. 1-3.30, 8-10.30 pm., Thurs. 9-11 pm.
11.000	PLP	BANDOENG, JAVA, 27.27 m. Relays YDB. 5.30-10.30 or 11 am. Sat. until 11.30 am.	9.930	CSW	BOGOTA, COL., 30.21 m. Works Rio evenings.	9.590	VK6ME	PERTH, W. AUSTRALIA, 31.38 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-8 am. exc. Sun.
10.970	OCI	LIMA, PERU, 27.35 m. Works Bogota, Col. evenings.	9.925	JDY	LISBON, PORTUGAL, 30.31 m., Addr. Nat. Broad. Station. 5-7 pm.	9.590	VK2ME	SYDNEY, AUSTRALIA, 31.38 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sun. 1-3 am., 5-11 am.
10.840	KWV	DIXON, CALIF., 27.68 m., Addr. A. T. & T. Co. Works with Hawaii evenings.	9.890	LSN	DAIREN, MANCHUKUO, 30.23 m. Relays JQAK daily 6.50-8 am.	9.590	W3XAU	PHILADELPHIA, PA., 31.28 m. Relays WCAU Sun. 12 n.-2 pm., 3-7 pm., Mon. 12 n.-3 pm., Tues. 12 n.-1 pm., 3.30-7 pm., Wed. 12 n.-1 pm. 3.30-8 pm. Thurs.-Sat., 12n-8 pm.
10.770	GBP	RUGBY, ENGLAND, 27.85 m. Works Australia early morning.	9.870	WON	BUENOS AIRES, ARG., 30.33 m., Addr. (See 10.300 mc.) Works N. Y. C. evenings.	(Continued on page 496)		
10.740	JVM	NAZAKI, JAPAN, 27.93 m. Works U.S.A. 2-7 am.	9.860	EAQ	LAWRENCEVILLE, N. J., 30.4 m., Addr. A. T. & T. Co. Works England nights.			
10.675	WNB	LAWRENCEVILLE, N. J., 28.1 m., Addr. A. T. & T. Co. Works with Bermuda irregularly.	9.830	IRM	MADRID, SPAIN, 30.43 m., Addr. Post Office Box 951. Daily 5.15-7.30 pm., Sat. also 12 n.-2 pm.			
10.570	CEO	SANTIAGO, CHILE, 28.12 m. Daily 7-7.15 pm.	9.800	XG0X	ROME, ITALY, 30.52 m. Works Egypt afternoons.			
10.460	JVN	NAZAKI, JAPAN, 28.14 m. Broadcasts daily 2-8 am. Works Europe irregularly at other times.			NANKING, CHINA, 30.61 m., Relays XGOA 6-10 am.			

(All Schedules Eastern Standard Time)

Short Wave League

HONORARY MEMBERS

Dr. Lee de Forest Manfred von Ardenne
D. E. Replogle E. T. Somerset
John L. Reinartz Hollis Baird
Hugo Gernsback, Executive Secretary



Mr. Li Chi-Chiang of Quebec, 42nd Scout Trophy winner, at his listening post. The Trophy stands atop the receiver.

WHEN TO LISTEN IN

by
M. Harvey Gernsback

All Schedules in Eastern Standard Time

POLAND. A new short wave station in Warsaw is now on the air. It is SPD, operating on 11.535 mc. and employing a directional antenna toward North America. The transmitter has a power of 2 kw. Special programs are broadcast for North America daily from 6-7 p.m., and on Sundays from 6-8 p.m. Both of these transmissions are radiated simultaneously on SPW 13.635 mc., 10 kw., also using a directional antenna for North America. The station has notified us that verification requests should be addressed to Polskie Radio, 5 Mazowiecka, Warsaw.

SOUTH AFRICA. South Africa can now be added to the list of easy catches for short-wave listeners. A new station at Klipheval, South Africa is operated on 9.62 mc. relaying the programs of the Cape Town and Johannesburg broadcast stations. The power of this station is about 2 kw. according to information received from South Africa. At present the station operates daily except Saturday, 11:45 p.m.-12:40 a.m., daily except Sunday, 9-11:40 p.m., and on Sunday from 8-10:15 a.m. At other hours the old Johannesburg station on 6.097 mc. takes the place of this station. The first transmission period from 11:45 p.m.-12:40 a.m., is being heard very well in the United States. The program material consists of setting-up exercises interspersed with news bulletins. At midnight the Johannesburg "Big Ben" can be heard striking 7 a.m. Within the next month or two there will be greatly increased activity among the South African short-wave broadcasters. We hope to have further details next month.

GUATEMALA. TGWA at Guatemala City has just put a new transmitter on the air operating on three new frequencies in place of its old frequency. The new frequencies are: 17.8, 11.76, and 9.685 mc. At present the schedule of operation is not very regular but the station is supposed to broadcast a program to North American listeners on Tuesdays and Thursdays from 8-10 p.m., on 11.76 or 9.685 mc. The station employs considerable power and has a number of directional antennas. It has been putting very good signals into the Eastern part of the United States. Incidentally, the designer and

chief engineer of the Guatemala stations is C. H. W. Nason, whom old readers of *Short Wave Craft* may recall as a frequent contributor to the magazine in years gone by.

URUGUAY. CXA8 at Colonia, Uruguay, is being heard daily relaying the programs of one of the broadcast stations in Buenos Aires, Argentina, which lies across the river Plata from Uruguay. This station generally relays programs of LR3 from 6 a.m. to 11 p.m. daily on a frequency of 9.64 mc. Reports should be addressed to Belgrano 1841, Buenos Aires, Argentina. This station operates but 20 kc. away from LRU, Buenos Aires so it is necessary to do some careful tuning in order not to confuse the two.

GERMANY. Station DJL, 15.11 mc. seems to be using a directional antenna towards North America every day during the African program from 10:40 a.m.-4:30 p.m., as it is being heard very well in the United States. DJC, 6.02 mc. is now on every evening from 4:50-10:45 p.m. on the North America program in conjunction with DJD, 11.77 and DJB 15.2 mc.

MOSCOW. Last month saw a great deal of activity on the part of the Russian stations because of the fact that it was the twentieth anniversary of the Red revolution and many gala programs were arranged. At the present time the English programs on RAN, 9.6 mc. broadcast daily from 7-9:15 p.m., are also broadcast on RKI, 7.52 mc.

HOLLAND. PCJ also had an anniversary last month, for it was in November 1927 that PCJ first came on the air. Ten years is a long time in any field but especially in short-wave broadcasting. To commemorate this tenth anniversary the station has just completed a new 60 kw. transmitter and a novel beam antenna system (which is described elsewhere in this issue). Holland is being heard with renewed vigor all over the world. A greatly enlarged schedule for PCJ is projected. Details are still lacking, however.

CANADA. A new short-wave broadcaster is

CJCX, the Sydney, Nova Scotia station on 6.01 mc. It relays programs of CJCB, generally from 7 a.m. to 1 p.m., and from 4-8 p.m.

BOSTON. W1XAL, the educational station of the World Wide Broadcasting Foundation is presenting some programs of unusual interest this year. For example on Tuesday evenings from 8-8:30 p.m., one of a series of programs sponsored by Harvard University is broadcast. This series deals with sound. Other educational programs are broadcast regularly by the station, many originating at Harvard University. Listeners desiring further information should write to the station at the University Club, Boston, Mass. W1XAL operates on 15.25, 11.79 and 6.04 mc. Consult the Station List for schedules of operation.

PITTSBURGH. W8XK has been hard at work erecting a series of new beam antennas for use in directing programs to South America and Europe. At the same time modernization of the transmitters has been undertaken. When alterations are completed power will be 28 kw. on 6.14 mc., 24 kw. on 11.5 mc., 8 kw. on 15.21 mc. and 6 kw. on 21.54 mc. The new antennas operate on all frequencies except 21.54. The changes should be completed by December 1st, 1937.

BRAZIL. PRA8 of the Radio Club de Pernambuco, Recife, Brazil, is now operating daily on 6.01 mc., according to information received from a listener in Rio.

(Continued on page 513)

Additions to Station List

Mc.	Call	Location
24.600	W9XJL	SUPERIOR, WISCONSIN
17.800	TGWA	GUATEMALA CITY, GUAT.
11.910	CB1190	VALDIVIA, CHILE
11.780	TGWA	GUATEMALA CITY, GUAT.
11.700	CB1170	SANTIAGO, CHILE
11.530	SPD	WARSAW, POLAND
9.800	XGOX	NANKING, CHINA
9.685	TGWA	GUATEMALA CITY, GUAT.
9.640	CXA8	COLONIA, URUGUAY
9.620	KLIPHEVAL, SOUTH AFRICA
9.580	OAXSC	ICA, PERU
5.530	TANANARIVE, MADAGASCAR
7.520	RKI	MOSCOW, U.S.S.R.
6.490	H1IL	SANTIAGO De Los CABALLEROS, D. R.
6.220	SAIGON, INDO-CHINA
6.110	GSL	DAVENTRY, ENGLAND
6.050	GSA	DAVENTRY, ENGLAND
6.010	TANANARIVE, MADAGASCAR
6.010	CJCX	SYDNEY, NOVA SCOTIA

Mc.	Call		Mc.	Call		Mc.	Call	
9.680	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1, 6.20-8.30, 9-11 pm.	9.428	COCH	HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado. 7 am.-1 am.	7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations. Sat. 5.30-6.30 pm.
9.680	VK3LR	MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Daily 3.30- 8.30 am. (Sat. till 9 am.) Sun. 3-7.30 am. Daily exc. Sat. 9.45 pm.-2 am.	9.415	PLV	BANDOENG, JAVA, 31.87 m. Works Holland around 9.45 am. Broadcasts 5.30-9.30 am., 6-6.30 pm.	7.715	KEE	BOLINAS, CAL., 38.89 m. Relays NBC and CBS programs in evening irregu- larly.
9.580	OAX5C	ICA, PERU, 31.32 m. 6-10 pm.	9.350	COBC	HAVANA, CUBA, 32.09 m. Addr. P.O. Box 132. Relays CMBC. 6.55 am.-12.30 am.	7.825	RIM	TACHKENT, U.S.S.R., 39.34 m. Works with Moscow in early morning.
9.570	KZRM	MANILA, P. I., 31.35 m., addr. Erlanger & Galingier, Box 283. 4.30-5.30 pm., 9 pm.-10 am.	9.330	CGA4	DRUMMONDVILLE, CANADA, 32.15 m. Works England irregularly.	7.810	KWX	DIXON, CAL., 39.42 m. Works with Hawaii, Philippines, Java and Japan, nights.
9.570	W1XK	SPRINGFIELD, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. Relays WBZ 7 am.-to 1 am. Sun. 8 am. to 1 am. OAX5C.	9.330	OAX4J	LIMA, PERU, 32.15 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.- 1 am.	7.850	T18WS	PUNTA ARENAS, COSTA RICA, 39.74 m., Addr. "Ecos Del Pacifico", P. O. Box 75. 6 pm.-12 m.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.45 pm.	9.300	YNGU	MANAGUA, NICARAGUA, 32.26 m. 12 n.-2 pm., 6-7 pm.	7.820	KKH	KAHUKU, HAWAII, 39.87 m. Works with Dixon and broadcasts irregularly nights.
9.550	OLR3A	PRAGUE, CZECHOSLOVAKIA, 31.41 m. See 11.840 mc. Daily 2.30-4.30 pm. Irreg. 7-9-10 pm.	9.280	GCB	RUGBY, ENGLAND, 32.33 m. Works Canada and Egypt evenings and after- noons.	7.520	RKI	MOSCOW, U. S. S. R., 39.87 m., Relays RAN 7-9.15 pm.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m., 11.30 am.- 4 pm., 7 pm.-12 m.	9.170	WNA	HAVANA, CUBA, 32.50 m., Addr. San Miguel 146. Relays CMBX 7 am.-12 m.	7.510	JVP	NAZAKI, JAPAN, 39.95 m. Irregular.
9.550	YDB	SOERABAJA, JAVA, 31.41 m., Addr. N.I. R.O.M. Daily exc. Sat. 6-7.30 pm., 5.30 to 10.30 or 11 pm. Sat. 5.30-11.30 am.	9.160	YVR	LAWRENCEVILLE, N. J., 32.72 m. Works England evenings.	7.500	RKI	MOSCOW, U.S.S.R., 40 m. Works with RIM early am.
9.540	DJN	BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 12.05-11 am., 4.50-10.45 pm.	9.125	HAT4	MARACAY, VENEZUELA, 32.79 m. Works with Europe afternoons.	7.390	ZLT2	WELLINGTON, N. Z., 40.6 m. Works with Sydney, 3-7 am.
9.540	VPD2	SUVA, FIJI ISLANDS, 31.45 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am.	9.080	TFK	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Sun. and Wed. 7-8 pm., Sat. 6-7 pm.	7.380	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sunday 6-7 pm.
9.535	H89D	ZURICH, SWITZERLAND, 31.46 m., Addr. Radio Club of Zurich, Post Box Zurich 2. Sun. 9-11 am., Thur. 1-3 pm.,	9.030	COBZ	REYKJAVIK, ICELAND, 33.11 m. Works London afternoons.	7.220	HKE	BOGOTA, COL., S. A., 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.
9.530	W2XAF	SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 4 pm.-1 am.	9.020	GCS	HAVANA, CUBA, 33.2 m., Radio Salas. Addr. P. O. Box 866, 7:45 am.-12.10 am. Irreg. 12.30-2 am. Relays CMBZ	7.200	YNAM	MANAGUA, NICARAGUA, 41.67 m. Daily at 9 pm.
9.530	---	TANANARIVE, MADAGASCAR, 31.48 m., Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 3.30-4.30, 10-11 am.	9.010	KEJ	RUGBY, ENGLAND, 33.26 m. Works N. Y. C. evenings.	7.100	FOJAA	PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Papeete. Tues. and Fri. 11 pm.-12 m.
9.525	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1.15 am., 4-10 am. Sun. 3-9.30 am.	8.957	VWY	BOLINAS, CAL., 33.3 m. Relays NBC and CBS programs in evening irregu- larly.	7.088	PI1J	DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
9.525	LKJ1	JELOY, NORWAY, 31.49 m. 5-8 am.	8.960	TPZ	KIRKEE, INDIA, 33.43 m. Works with England in morning.	6.998	PZH	PARAMIRABO, DUTCH GUIANA, 42.88 m., Addr. P. O. Box 18. Daily 6.06-8.36 am., Sun. 9.36-11.36 am., Daily 5.36-8.36 pm.
9.520	HJ4ABH	ARMENIA, COLOMBIA, 31.51 m. 8- 11 am., 6-10 pm.	8.830	HCJB	ALGIERS, ALGERIA, 33.48 m. Works Paris afternoons.	6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
9.520	OZF	SKAMLEBOAEK, DENMARK, 31.51 m., Addr. Statsradiofonlen, Copenhagen. 2-6.40 P.M.	8.775	PNI	QUITO, ECUADOR, 33.95 m. 8.30-10.30 pm. except Monday.	6.976	HCETC	QUITO, ECUADOR, 43m., Addr. Teatro Bolívar. Thurs. till 9.30 pm.
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Ir- regular 6-10 pm.	8.765	DAF	MAKASSER, CELEBES, N. I., 34.19 m. Works Java around 4 am.	6.905	GDS	RUGBY, ENG., 43.45 m. Works N.Y.C. evenings irregularly.
9.520	XEDQ	GUADALAJARA, GAL., MEXICO, 31.51 m. Irregular 7.30 pm. to 12.30 am.	8.760	GCQ	NORDDEICH, GERMANY, 34.23 m. Works German ships irregularly.	6.880	KEL	BOLINAS, CALIF., 43.70 m. Tests irregularly. 11 am.-12 n., 6-9 pm.
9.510	VK3ME	MELBOURNE, AUSTRALIA, 31.55 m., Addr. Amalgamated Wireless of Aus- tralasia, 167 Queen St. Daily except Sun. 4-7 am.	8.750	FZE8	RUGBY, ENGLAND, 34.25 m. Works Africa afternoons.	6.850	XGOX	NANKING, CHINA, 43.8 m. Daily 6.40-8.40 am., Sun. 4.40-6.05 am.
9.510	GSH	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 3.15-5.30 am., 12.20-6 pm., 6.20-8.30, 9-11 pm.	8.730	GCI	DJIBOUTI, FR. SOMALILAND, AFRICA, 34.29 m. Works Paris around 2.30 am.	6.800	HI7P	CIUDAD TRUJILLO, DOM. REP., 44.12 m., Addr. Emisorita Diaria de Comercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40- 1.40 pm. Sun. 10.40 am.-11.40 am.
9.510	H83PJ	BANGKOK, SIAM, 31.55 m. Thursday, 8-10 am.	8.720	VPD3	RUGBY, ENGLAND, 34.36 m. Works India 8 am.	6.770	HIH	SAN PEDRO DE MACORIS, DOM. REP., 44.26 m. 12.10-1.40 pm., 7.30- 9 pm. Sun. 3-4 am., 4.15-6 pm., 4.40- 7.40 pm.
9.505	HJ1ABE	CARTAGENA, COLOMBIA, 31.57 m. Addr. P. O. Box 31. 5-10.30 pm.	8.700	HKV	SUVA, FIJI ISLES, 34 m., Addr. (See 9.540 mc., VPD2). 5.30-7 am.	6.775	WOA	LAWRENCEVILLE, N. J., 44.41 m., Addr. A. T. & T. Co. Works England evenings.
9.500	XEWV	MEXICO CITY, MEX., 31.58 m. Addr. Apart. 2516. Relays XEW. 6 pm.-12 m.	8.680	GBC	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.	6.750	JVT	NAZAKI, JAPAN, 44.44 m., Addr. Kokusai-Denwa Kaisha, Ltd., Tokio. Irregular.
9.500	HJU	BUENAVENTURA, COLOMBIA, 31.58 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.	8.665	COJK	MANAGUA, NICARAGUA, 34.92 m. 7.30-9.30 pm.	6.730	HI3C	LA ROMANA, DOM. REP., 44.58 m., Addr. "La Voz de la Feria." 12.30- 2 pm., 5-6 pm.
9.500	PRF6	RIO DE JANEIRO, BRAZ., 31.58 m. Irregularly 4.45 to 5.45 pm.	8.600	WOO	OCEAN GATE, N. J., 35.05 m. Works ships irregularly.	6.720	PMH	BANDOENG, JAVA, 44.64 m. Relays NIROM programs. 5.30-9 am.
9.475	EAR	MADRID, SPAIN, 31.65 m., Addr. (See 9.860 mc.) 7.30-9.30 pm.	8.400	HC2CW	QUAYAQUIL, ECUADOR, 35.71 m. 11.30 am.-12.30 pm., 8-11 pm.	6.710	TIEP	SAN JOSE, COSTA RICA, 44.71 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-10 pm.
★ S.W. BROADCAST BAND ★			8.380	IAC	CAMAGUEY, CUBA, 34.62 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.	6.672	YVQ	MARACAY, VENEZUELA, 44.95 m. Sat. 8-9 pm.
9.450	ICK	TRIPOLI, N. AFRICA, 31.71 m. Works Rome, 5.30-7 am.	8.330	YNLQ	MANAGUA, NICARAGUA, 34.92 m. 7.30-9.30 pm.	6.670	HC2RL	QUAYAQUIL, ECUADOR, S. A., 44.95 m., Addr. P. O. Box 759. Sun. 5.45- 7.45 pm., Tues. 9.15-11.15 pm.
9.450	TQWA	GUATEMALA CITY, GUATEMALA, 31.75 m., Addr. Ministre de Fomento. Daily 12 n. to 2 pm., 8 pm. to 12 m. Sat. 9 pm. to 5 am. (Sun.)	8.280	SUX	ABOU ZABAL, EGYPT, 38.17 m. Works with Europe, 4-6 pm.	6.630	HIT	CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor," Apartado 1105. Daily exc. Sun. 12.10- 1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
9.440	HC2RA	QUAYAQUIL, ECUADOR, 31.78 m. Irregularly till 10.40 pm.	7.954	HC2J5B	QUAYAQUIL, ECUADOR, 38.2 m. Evenings.	(Continued on page 500)		

(All Schedules Eastern Standard Time)



Here is a front view of the very professional looking Desk-Type Transmitter.

A Desk-Type 10-80 Meter Transmitter

(Part 2—Conclusion)

By George W. Shuart, W2AMN

In this concluding half of the article on the Desk-Type Transmitter, Mr. Shuart describes in detail the unique power-supply and the speech amplifier.

● LAST MONTH we described the radio frequency portion of the *Desk-Type Transmitter*. This transmitter is enclosed in a single cabinet measuring only $19 \times 10\frac{1}{2} \times 13$ inches. All equipment is enclosed in the cabinet with only the microphone and the key remaining on the outside. This makes a complete station, consisting of only two small cabinets, the other, of course, being the receiver.

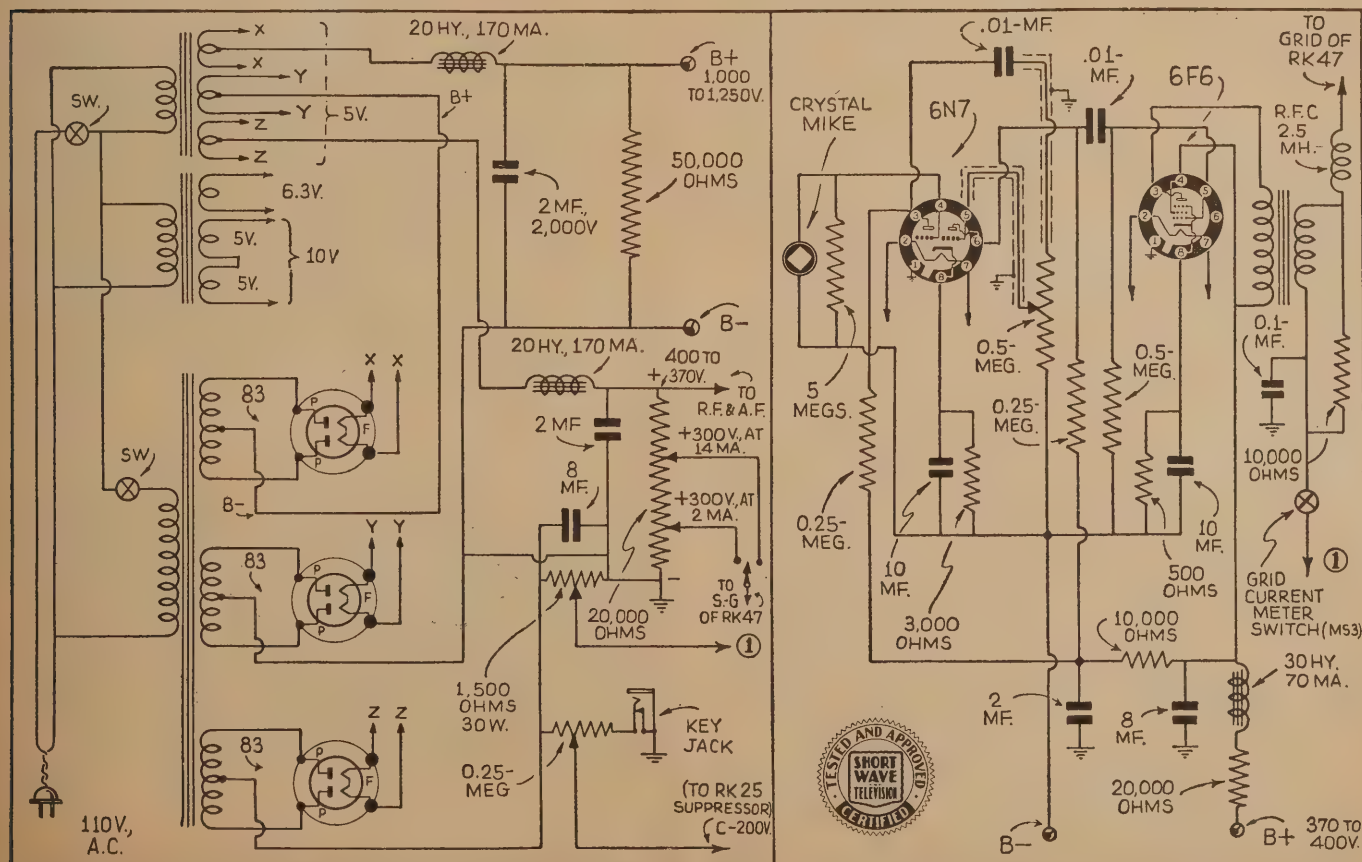
The remaining parts of the transmitter which will be described in this article are the power-supply and the low-power audio unit used for grid-modulating the RK-47 final amplifier. It is no easy task—selecting the parts to go into the small space allowed for the power-supply and modulator in this type of transmitter. If it were not for the Kenyon triple winding transformer it would not have been possible to confine the trans-

mitter to such small quarters. This transformer has three windings which are center-tapped and supply slightly over 500 volts each from an 83 rectifier. One of these is used to supply the plate and screen voltages for the 41 oscillator and the RK-25 buffer, screen voltage for the final amplifier, grid bias for the final stage and keying voltage for the suppressor grid of the RK-25. This meant that the output of this winding had to be divided into two parts, one supplying the *positive* voltage for the plates and screens and the other supplying the necessary *negative* voltage for bias and keying purposes. Fixed bias is used on the final amplifier in order to permit keying the suppressor of the buffer-doubler tube. This method of keying is unquestionably the most convenient, in as much as it results in *clickless keying* and permits *break-in* on any band,

with a moderately selective receiver.

The key circuit is so arranged that when the key is *up*, the full negative voltage is applied to the suppressor, cutting off excitation to the final amplifier. When the key is pressed down the proper bias is applied to the suppressor, allowing just the proper excitation of the final amplifier. This is accomplished by placing a potentiometer across the bias portion of the power-supply. The center arm goes to the suppressor, permitting easy adjustment of excitation. The key is connected in series with the potentiometer at the grounded end. Because the RK-25 has an output many times that required for the final amplifier and, too, because the excitation must be carefully adjusted for grid-modulation, this variable suppressor voltage arrangement is absolutely

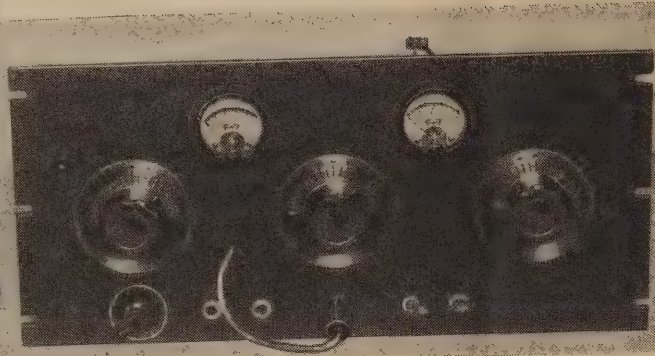
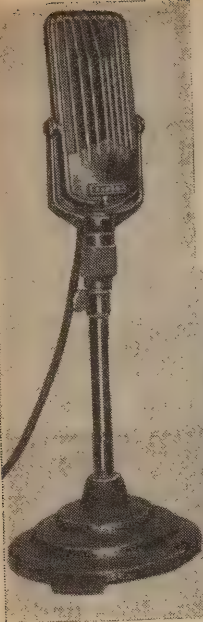
(Continued on page 506)



Diagrams are given above for the novel power-supply unit, especially designed by Mr. Shuart for use with this very compact Desk-Type Transmitter, and also the low-power audio amplifier.

100 Watt QRM Dodger

By Art Gregor



100-watt, 5-meter transmitter with the Velotron microphone.

● THE hard and loud cry for frequency stability in 5 meter transmitters has not gone unheeded. This is evidenced by the great number of crystal-controlled transmitters now in operation and also by the great number of really stabilized M.O.P.A.'s.

The conventional crystal-control transmitter for 5-meter operation offers a terrific disadvantage in that the frequency cannot be varied, or else in order to use a variable crystal such as are now available, the transmitter must be more complicated. It would seem to us that with the average good 5-meter receiver, which has a band width of from 20 to 40 kc., the stabilized M.O.P.A. offers the best solution to the QRM problem. If, however, all transmitters were crystal controlled the problem would not be so great because the receiver could be more selective and besides the transmitters would not take up so much space. But, unfortunately, it seems that this result will be a long time coming.

The M.O.P.A. shown in the photograph is nothing more than the original 6L6 M.O.P.A. described by the writer in the Sept., 1936, issue, to which has been added a pair of RK37's in order to boost the power to around 100 watts. The stability of the 6L6 M.O.P.A. is well known to the 5 meter gang, and of course, its stability is not changed in the least by the addition of the higher powered push-pull amplifier. The RK37's were selected because of their fairly modest driving power requirements. The single 6L6 provides sufficient driving power for this stage for class "C" operation with up to 150 watts input.

The oscillator tuning circuit is tuned to 10 meters and the circuit is relatively high C. The QRM proposition is simply overcome here in the oscillator portion of the transmitter. A very small capacitor is connected in parallel with the tank condenser in a sort of band-spread arrangement.

While the photograph shows this condenser to be mounted with its control on the panel, the ideal arrangement is to employ a long flexible shaft where the transmitter is not mounted directly on the operating desk. The dial which controls this band-spread condenser can be calibrated directly in the 5 meter band. It is possible to shift several hundred kc. by merely adjusting this small condenser.

The entire transmitter should be adjusted to a frequency exactly in the center of the small band over which we desire to QSY. It will then be found that retuning the other stages is not necessary when a slight adjustment is made in the oscillator circuit. This variable control proved to be one of the greatest assets to any 5 meter rig we had ever employed, because you can readily adjust the frequency to avoid QRM during a QSO.

In order to improve efficiency, in the final amplifier circuit a Bud neutralizing condenser of the disc type was used for tuning. The average condenser of the multi-plate type which would serve with this transmitter contains entirely too much metal and framework. This disc type condenser works out very well, besides being economical.

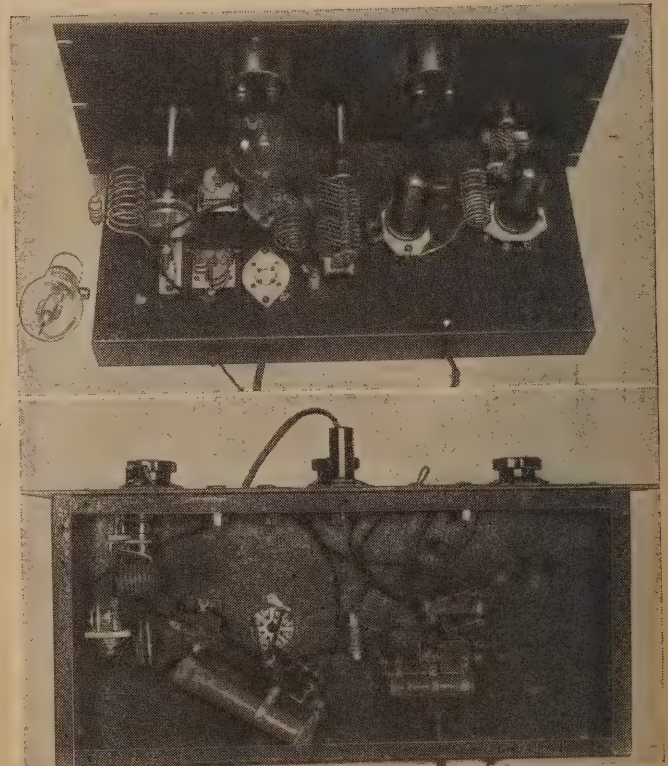
The entire transmitter is mounted on an 8 $\frac{3}{4}$ "x19" standard relay rack panel. The chassis is only 2" deep by 17"

long and 8" wide. This makes an exceptionally compact arrangement and it can be placed in the relay rack along with the other transmitters employed for the lower frequencies. By use of plug cables it only becomes necessary to plug the 5 meter transmitter into the power-supply and modulator units used for other bands, thus allowing quick change-over with a minimum of apparatus.

While we call this a 100 watt transmitter, it is possible to run the input up to 200 watts with the final amplifying tubes running moderately cool, and showing no signs of overloading. The output under these conditions is at least 150 watts and needless to say represents a real husky signal.

Results with this transmitter are more than gratifying; its ability to break through, due no doubt to the 100 to 150 watt output, together with the adjustable-frequency feature, make it an ideal transmitter for the coming 5 meter DX season. No information is given or suggested regarding the antenna. Sufficient data has already been published on various types of 5 meter antennas, and no doubt the location and certain limitations due to surrounding buildings, etc., would dictate the use of an antenna other than the one we suggested, so we leave the selection to the readers.

Any of the various co-axial cables recently introduced, together with a half-wave antenna or a beam should make this transmitter almost unbeatable. 100 watts with a good beam antenna will really go places on 5 meters.



Rear and bottom views of the 100 watt M.O.P.A. Note in the left-hand corner of the bottom view, the oscillator tuning circuit; the large condenser is in the tank circuit, while the smaller one with its knob on the panel is the vernier which is employed for shifting frequency in order to dodge QRM. The dial should be directly calibrated in the 5-meter band.



Length
Winding Diameter Wire
1 " $\frac{3}{4}$ " No. 12
(Cont. on page 513)

The constructional details are simple; we merely cut (Continued on page 513)

Call	Mc.		Mc.	Call		Mc.	Call
6.925	PNADO	RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm.	6.220		SAIGON, INDO-CHINA, 48.2 m., Addr. Radio Philco. 4.30 or 5.30-9.30 am.	6.110	GSL
6.590	COCU	HAVANA, CUBA, 45.52 m., Addr. Estrada Palma 25, Vibora, Havana. Relays CMCU 7 am.-12 m.	6.210	YV5RI	CORO, VENEZUELA, 48.31 m., Addr. Roger Leyba, care A. Urbina y Cia. Irregular.		
6.558	H14D	CIUDAD TRUJILLO, D. R., 45.74 m. Except Sun. 11.55 am.-1.40 pm.	↓ S.W. BROADCAST BAND ↓				
6.550	XBC	VERA CRUZ, MEX., 45.8 m. 8.15-9 am.	6.190	H10Q	CIUDAD TRUJILLO, D. R., 48.47 m. 11.45 am.-1 pm., 4.45-6.45 pm.	6.100	W1XAL
6.550	TIRCC	SAN JOSE, COSTA RICA, 45.8 m., Addr. Radioemisora Catolica Costarricense. Sun. 11 am.-2 pm., 6-7, 8-9 pm. Daily 12 n.-2 pm., 6-7 pm., Thurs. 6-11 pm.	6.185	H1TA	SANTIAGO, D. R., 48.5 m., Addr. P. O. Box 423. 11.40 am.-1.40 pm.; 7.40-9.40 pm.; Wed. 6-10.30 pm.	6.100	W9XF
6.545	YV0RB	BOLIVAR, VENEZUELA, 45.84 m., Addr. "Ecos de Orinoco." 6-10.30 pm.	6.171	XEXA	MEXICO CITY, MEX., 48.61 m., Addr. Dept. of Education. 7-11 pm.	6.100	HJ4ABE
6.530	YN10Q	MANAGUA, NICARAGUA, 45.94 m., Addr. "La Voz de los Lagos." 8-9 pm.	6.160	YV5RD	CARACAS, VENEZUELA, 48.7 m. 11 am.-2 pm., 4-10.40 pm.	6.097	ZTJ
6.520	YV4RB	VALENCIA, VENEZUELA, 46.01 m. 11 am.-2 pm., 5-10 pm.	6.150	VPB	COLOMBO, CEYLON, 48.7 m. Daily exc. Thurs. and Fri., 6.30 am.-12.30 pm.; Sun. 7-11.30 am.	6.095	JZH
6.500	HIL	CIUDAD TRUJILLO, D. R., 46.15 m., Addr. Apartado 623. 12.10-1.40 pm., 5.40-7.40 pm.	6.150	CSL	LISBON, PORTUGAL, 48.78 m. Irregu- lar. 7-8.30 am., 2-7 pm.	6.092	OAX4Z
6.500	T10W	PUERTO LIMON, COSTA RICA, 46.15 m., Addr. Ondas del Caribe. Daily 12 n.-1.30 pm.	6.150	CJRO	WINNIPEG, MAN., CANADA, 48.78 m., Addr. (See 11.720 mc.) 4-10 pm.	6.090	HJ4ABC
6.490	H11L	SANTIAGO DE LOS CABALLEROS, D. R., 46.2 m., 6-9 pm.	6.147	ZEB	BULAWAYO, RHODESIA, S. AFRICA, 48.8 m. Sun. 3.30-5 am.; Mon., Wed. and Fri., 1.15-3.15 pm.; Tues. 11 am.- 12 n.; Thurs. 10 am.-12 n.	6.090	CRCX
6.477	H14V	SAN FRANCISCO de MACORIS, D. R., 46.32 m. 11.40 am.-1.40 pm., 5.10- 9.40 pm.	6.147	COKQ	SANTIAGO, CUBA, 48.8 m., Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3- 4.30 pm., 10-11 pm., 12 m.-2 am.	6.090	XEBF
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas Tenorio, "La Voz del Mombacho." Irregular	6.145	HJ4ABU	PEREIRA, COL., 48.8 m. 9.30 am.-12 m., 6.30-10 pm.	6.085	HJ5ABD
6.460	H10A	CIUDAD TRUJILLO, D. R., 46.51 m. 8.40-10.40 am., 2.40-4.10 pm. Sat. 9.40-10.40 pm. Sun. 2.40-4.40 pm.	6.140	W8XK	PITTSBURGH, PA., 48.86 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 10 pm.-1 am.	6.083	VQ7LO
6.420	H11S	SANTIAGO, D. R., 46.73 m. 11.40 am. -1.40 pm., 5.40-7.40, 9.40-11.40 pm.	6.137	CR7AA	LAURENCO MARQUES, PORT. E. 48.87 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.	6.080	ZHJ
6.410	T1PB	SAN JOSE, COSTA RICA, 46.8 m., Addr. Apartado 225, "La Voz de la Victor." 12 n.-2 pm., 6-11.30 pm.	6.135	HJ1ABB	BARRANQUILLA, COL., 48.9 m., Addr. P. O. Box 715. 11.30 am.-1 pm., 4.30- 10 pm.	6.080	CP5
6.400	YV5RH	CARACAS, VENEZUELA, 46.88 m. 7-11 pm.	6.135	H1EN	SANTIAGO, D. R., 48.9 m. 6.40-9.10 pm	6.080	WSXAA
6.395	COX4S	MARIANAO, CUBA, 46.9 m., Addr. Jefe del Cuerpo de Senales de la Republica de Cuba, Ciudad Militar, Marianao. Tests daytime and evenings.	6.130	TQXA	GUATEMALA CITY, GUAT., 48.94 m., Addr. Giornal Liberal Progressista. Irregularly.	6.079	DJM
6.390	YV5RF	CARACAS, VENEZUELA, 47.02 m., Addr. Box 983. 6-10.30 pm.	6.130	VP5BQ	GEORGETOWN, BRIT. GUIANA, 48.94 m. From 5 pm. on.	6.070	VP3MR
6.380	HRP1	SAN PEDRO SULA, HONDURAS, 47.19 m. 7.30-9.30 pm.	6.130	COCD	HAVANA, CUBA, 48.94 m., Addr. Calle G y 25, Vedado. Relays CMCD 10 am-10 pm.	6.070	HJ3ABF
6.360	YV1RH	MARACAIBO, VENEZUELA, 47.19 m., Addr. "Ondas Del Lago." Apartado de Correos 261. 6-7.30 am., 11 am.-2 pm., 5-11 pm.	6.130	VEHXX	HALIFAX, N. S., CAN., 48.94 m., Addr. P. O. Box 998. Mon.-Fri. 9 am.-1 pm., 5-11 pm. Fri.; 1-3 pm., Sat.; Sun. 9 am.- 1 pm., 2-11 pm. Relays CHNS.	6.070	CFRX
6.350	HRV	TEGUCIGALPA, HONDURAS, 47.24 m. 6.30-8.30 pm.	6.130	ZOE	KUALA LUMPUR, FED. MALAY ST., 48.94 m. Sun., Tue. and Fri. 6.40- 8.40 am.	6.070	YV1RE
6.340	H11X	CIUDAD TRUJILLO, D. R., 47.32 m. Sun. 7.40-10.40 am., daily 12.10-1.10 pm., Tues. and Fri. 8.10-10.10 pm.	6.130	LKL	JELOY, NORWAY, 48.94 m. 11 am.- 6 pm.	6.070	VE9CS
6.330	COCW	HAVANA, CUBA, 47.39 m. Addr. La Voz de las Antillas, P. O. Box 130. 6.55 am.-1 am. Sun. 10 am.-10 pm.	6.125	CXA4	MONTEVIDEO, URUGUAY, 48.98 m., Addr. Radio Electrico de Montevideo, Mercedes 823. 10 am.-12 n., 2-8 pm.	6.065	HJ4ABL
6.316	H1Z	CIUDAD TRUJILLO, D. R., 47.5 m. Daily except Sat. and Sun. 11.10 am.- 2.25 pm., 5.10-8.40 pm. Sat. 5.10- 11.10 pm. Sun. 11.40 am.-1.40 pm.	6.125	OAXTA	CHICLAYO, PERU, 48.98 m., Addr. La Voz de Chivlayo, Casilla No. 9. 8-11 pm.	6.060	WSXAL
6.310	TQ2	GUATEMALA CITY, GUAT., 47.55 m., Addr. Secretaria de Fomento. Relays TG1 11 pm.-2 am.	6.122	OAX4P	HUANCAYO, PERU, 49 m. La Voz del Centro del Peru. 8 pm. on.	6.060	W3XAU
6.300	YV4RG	MARACAY, VENEZUELA, 47.62 m. 8- 10.30 pm.	6.122	HP5A	PANAMA CITY, PAN., 49 m. Addr. Box 58. 12 n.-1 pm., 8-10 pm.	6.050	HP6F
6.280	COHB	SANCTI SPIRITUS, CUBA, 47.77 m., Addr. P. O. Box 85. 9-11.30 am., 12.30- 1.30, 4-7, 8-11 pm.	6.122	HJ3ABX	BOGOTA, COL., 49 m., Addr. La Voz de Col., Apartado 2665. 12 n.-2 pm., 5.30- 11 pm.; Sun. 6-11 pm.	6.050	QSA
6.260	H1Q	CIUDAD TRUJILLO, D. R., 47.77 m. 7.10-8.40 am., 12.40-2.10, 8.10-9.40 pm.	6.120	W2XE	NEW YORK CITY, 49.02 m., Addr. Col. B'cast. System, 485 Madison Ave. Irregular.	6.045	H19B
6.270	YV5RP	CARACAS, VENEZUELA, 47.79 m., Addr. "La Voz de la Philco." Irregular.	6.120	XEUZ	MEXICO CITY, MEX., 49.02 m., Addr. 5 de Mayo 21. Relays XEFO 1-3 am.	6.042	HJ1ABG
6.243	H1N	CIUDAD TRUJILLO, D. R., 48 m., Addr. "La Voz del Partido Dominicano." 12 m.-2 pm., 7.30-9.30 pm., irregularly.	6.115	OLR2C	PRAGUE, CZECHOSLOVAKIA, 49.05 m. (See 11.875 mc.)	6.040	W4XB
6.235	HRD	LA CEIBA, HONDURAS, 48.12 m., Addr. "La Voz de Atlantida." 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.	6.110	XEPW	MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.- 1 am.	6.040	W1XAL
6.230	YV1RG	VALERA, VENEZUELA, 48.15 m. 6-9.30 pm.	6.110	VUG	CALCUTTA, INDIA, 49.1 m. Daily 3- 5.30 am., 9.30 am.-12 m.; Sun 7.30 am.- 12 m.	6.040	YDA
6.230	OAX4G	LIMA, PERU, 48.15 m., Addr. Apartado 1242. Daily 7-10.30 pm.					

(All Schedules Eastern Standard Time)

(Continued on page 515)

DOERLE MODEL D-38

A. C. 171½ x 81½ x 81½

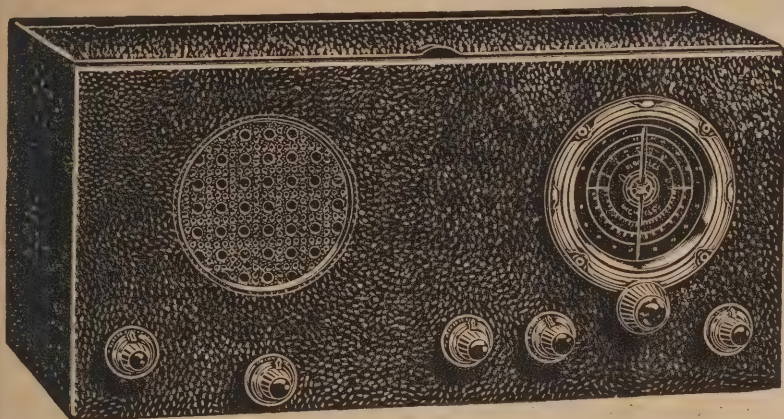
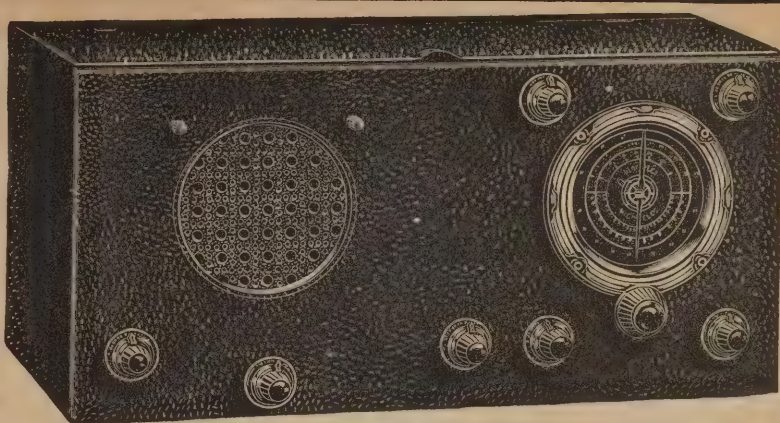
8 Tubes 41½ to 3000 Meters

The last word in short wave receivers. Before you buy send for circular D-38, an eight-page booklet containing schematic and picture diagrams, instructions, and sketches.

Read this booklet and compare with the other models you have in mind. Then send your order to the concern who in your opinion is giving you the best for your money.

Complete, with all coils, and tubes, no extras **\$32.50**

Kit, factory assembled, but unwired, less tubes, with all coils. **\$22.50**



DOERLE MODEL D-5

5 Tubes 91½ to 2000 Meters

Really a Junior of Model D-38. Intended primarily for the amateur or listener not interested in the five meter band.

Uses tuned radio frequency as does Model D-38 and the highly popular 6L6 as audio output beam power tube.

Again we request you to write for our catalog which describes this model in detail.

Available in amateur model which is shipped with special amateur bandspread coils or short wave listener model for which general coverage is supplied.

Complete with all coils and tubes, ready to use, no extras. **\$22.50**

Kit, factory assembled, but unwired, less tubes, with all coils. **\$19.50**

7C 5-Tube

Short Wave Receiver 8¼ to 625 meters



Bigger and More Powerful Than Ever
A Giant in Performance

Our Model 7C, A Midget in Size—A Giant in Performance. One of our most popular short wave receivers.

Our files contain many letters from satisfied listeners from all over the world which testify to the popularity of this set, and their lists of DX stations received on the loudspeaker is amazing.

Uses a 6K7 radio-frequency stage, a 6F7, twin 2 in 1 tube, as regenerative detector and first audio, one 6C5, one 12A7, twin 2 in 1 tube, and one K92A.

Earphone pack has been incorporated to permit the use of phone when loudspeaker operation is not desired. Operates from regular house current.

Size: 10x7½x7½.

Complete with all coils, 9½ to 600 meters, and all tubes, ready to use, nothing else to buy. **\$16.50**

In Kit form, but factory assembled, including all coils and tubes, but unwired. **\$12.95**

*Available in battery model upon special order at same price.

*Also available in ham model with special tuning circuit to provide additional bandspread at \$1.00 additional.

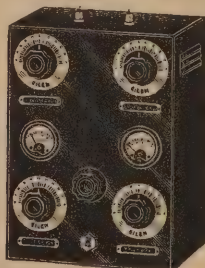
3 Tube Electric Model, complete, tested and ready to use, with 5 plug-in coils, 12 to 600 meters, at \$6.50.



Kit form, factory assembled, but unwired, with coils, less tubes, \$3.50. Available in battery model at same prices, if specified.



BS-5 Six tube Bandswitch Receiver, no plug-in-coils, select the band by a simple flip of the switch. Loudspeaker Operation. 12 to 600 meters, automatic headphone jack also included. Complete, ready to use, including tubes, factory wired and laboratory tested. **\$18.50**. Complete kit, factory assembled, ready to wire, including tubes and cabinet, **\$16.50**.



HF-20 SHORT WAVE TRANSMITTER

Uses 3 type 2A5 crystal control so as to deliver a good 20 watt output.

In kit form, including trip-let meter, coils for one band, less tubes, crystals and crystal holder. **\$11.95**

Tubes, extra. **\$1.75**

Crystal for 80 and 160 meters. **\$1.45**

Crystal holder. **\$1.00**

40 meter crystal. **\$2.75**

Coils for additional band (per set). **\$1.00**

Detailed information available in our catalog.

HF-35 TRANSMITTER IN KIT FORM \$21.95

Write for Complete Information

Universal 5 Bandswitch 5-Tube Receiver



Universal 5, five tube band-switch receiver. No plug-in coils are used 14 to 600 meters. By a simple flip of the switch bandspread tuning was incorporated. Full-sized dynamic speaker.

Uses the efficient time-tested electron-coupled regenerative method of detection. Operates on any 110 volt house lighting current.

Complete ready to use, nothing else to buy, laboratory tested. **\$16.50**

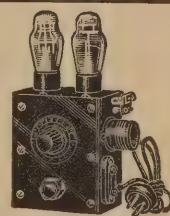
Not sold in kit form.

2-Tube Electric Set

Smallest receiver on the market. No fuss or feathers. Just essential and necessary parts make this an ideal receiver for the beginner, also an excellent gift for the shut-in. Complete with 5 coils, 2 tubes, wired and tested, 12 to 600 meters, which includes the broadcast band. **\$4.00**

In kit form, factory assembled with coils, but less tubes and unwired. **\$2.50**

Available for battery operation at the same price, if specified.



Information for old customers of Eilen Radio Laboratories, Guy Stokely Radio Corporation, and Centrallion Engineering Company. These three concerns have been purchased by the new owner whose name appears at the bottom of this advertisement. We solicit your continued patronage.

WRITE FOR NEW 1938 CATALOG OF SHORT WAVE APPARATUS

Enclose Stamp to Cover Mailing

OSCAR B. KUSTERMAN

68 BARCLAY ST. 1938 FREE CATALOGUE
NEW YORK CITY SEND STAMP TO COVER MAILING

Please mention SHORT WAVE & TELEVISION when writing advertisers

THE WORLD'S GREATEST RADIO VALUE!

THE DE LUXE CROSLEY FIVER

AMERICAN AND FOREIGN RECEPTION

FOR ONLY \$24.95

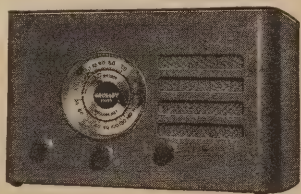
FIVER DE LUXE TABLE MODEL



The famous Crosley Fiver with striking advanced cabinet styling and featuring sensational foreign reception. Incorporates Crosley Mirro-Dial and all other famous features that have made and kept the Fiver "The World's Greatest Radio Value." Dimensions: 12 $\frac{1}{2}$ " high, 10 $\frac{1}{2}$ " wide, 6 $\frac{13}{16}$ " deep.

FIVER DE LUXE COMPACT

The same Crosley Fiver housed in an unusually attractive compact type cabinet. Offers the same outstanding features and brilliant American and Foreign reception found in the regular Fiver.



Dimensions: 8 $\frac{3}{8}$ " high, 13 $\frac{1}{16}$ " wide, 6 $\frac{13}{16}$ " deep. 5 tubes superheterodyne; 2 hands, 540-1720 Kc. and 5800-15,400 Kc.; full floating, moving coil electrodynamic speaker; full vision, illuminated, 3-dimensional Mirro-Dial; automatic volume control; power supply noise filter.

(Prices slightly higher in South and West)

THE CROSLEY RADIO CORPORATION
POWEL CROSLEY, Jr., Pres. CINCINNATI
Home of "the Nation's Station"—WLW—
500,000 Watts—70 on your dial.

YOU'RE THERE WITH A CROSLEY

Short Wave

The Forty-Fifth Trophy

Presented to **SHORT WAVE SCOUT**
FREDERICK LANAWAY

49 Granville Avenue, Edmonton,
London, N. 9, England

For his contribution toward the advancement of the art of Radio

by
SHORT WAVE and TELEVISION

Honorable mention John Szlucha, Owega, N.Y.

46 Stations verified—Europe, including Iceland.

● A Britisher, Fred Lanaway, of London, England, wins the trophy award for the Europe contest this month. This is the first time that the trophy has been awarded to a trans-Atlantic Short Wave Scout.

Mr. Lanaway submitted a list of 48 European stations, all but two of which came within the rules of the contest. All reception was on a 2-tube receiver, designed and built by the winner. The aerial system was an end-fed Hertz having a length of 42 feet, 9 inches. All reception was by headphones.

The listening period was from August 1 to 30, 1936.

Our congratulations, Mr. Lanaway. We trust the trophy meets with your approval.

List of Stations

PCJ, 15,220 kc., Radio Hilversum, Hilversum, Nederland.
OER2, 6,072 kc., Kurzwellessender Der Osterr. Österreich.
PHI, 17,775 kc., Philips' Radio, PHOHI Studios, Eindhoven, Holland.

LKJ1, 9,530 kc., Ministere Du Commerce, Oslo, Norvege.

CT1AA, 9,650 kc., Radio Colonial, Lisbon, Portugal.
TFJ, 12,235 kc., Icelandic State Broadcasting Service, Reykjavik, Iceland.

HVJ, 15,120 kc., Laudetur Jesus Christus, Citta Del Vaticano.

PCJ, 9,590 kc., Philips' Radio, Eindhoven, Holland.
PRAHA, 15,230 kc., Radio Journal, Prague, Czechoslovakia.

I2RO, 25.4 mtrs., Ente Italiano Audizioni Radiofoniche, Rome, Italy.

OER2, 11,801 kc., Kurzwellessender Der Osterr. Vienna, Österreich.

HVJ, 5,969 kc., Laudetur Jesus Christus, Citta Del Vaticano, Vatican City.

RKI, 15,145 kc., Radio Centre, Moscow, U.S.S.R.
RNE, 12,000 kc., (Same as above).

RAN, 9,520 kc., (Same as above).

TPA2, 15,245 kc., Paris, France.

TPA3, 11,880 kc., Paris, France.

TPA4, 11,715 kc., Paris, France.

DJE, 17,760 kc., Der Deutsche Kurzwellessender Berlin-Tempelhof, Germany.

DJR, 15,340 kc., (as above).

DJN, 9,540 kc., (as above).

DZE, 12,130 kc., (as above).

DJL, 15,110 kc., (as above).

DZC, 10,290 kc., (as above).

DJA, 9,560 kc., (as above).

(Continued on page 514)

South America Contest Closes December 24th

Beginning next month, the original type of contest will be run again. That is to say, there will be no restriction on the geographical location of the stations to be entered in any one contest. Each contest will be world-wide. Stations heard and verified during any

thirty-day period, regardless of their location, will be acceptable provided that at least 50% of the stations submitted are from countries other than the one in which the contestant resides. The first of these contests will close on January 24, 1938.

Contest Rules

The purpose of this contest is to advance the art of radio by "logging" as many short-wave phone stations, amateur stations excluded.

A notarized affidavit must be sent with the veri cards and, of course, all of the veris will have to be for the continent assigned for each particular contest. The trophy winner in the next contest will be published in the February issue.

By midnight, Dec. 24th, all entries for the South American contest must therefore be in the hands of the Editors, together with the veris and the notarized oath that the contestant personally listened to all of the stations listed.

In the event of a tie between two or more contestants, each listing the same number of stations, the judges will award a similar trophy to each contestant so tying.

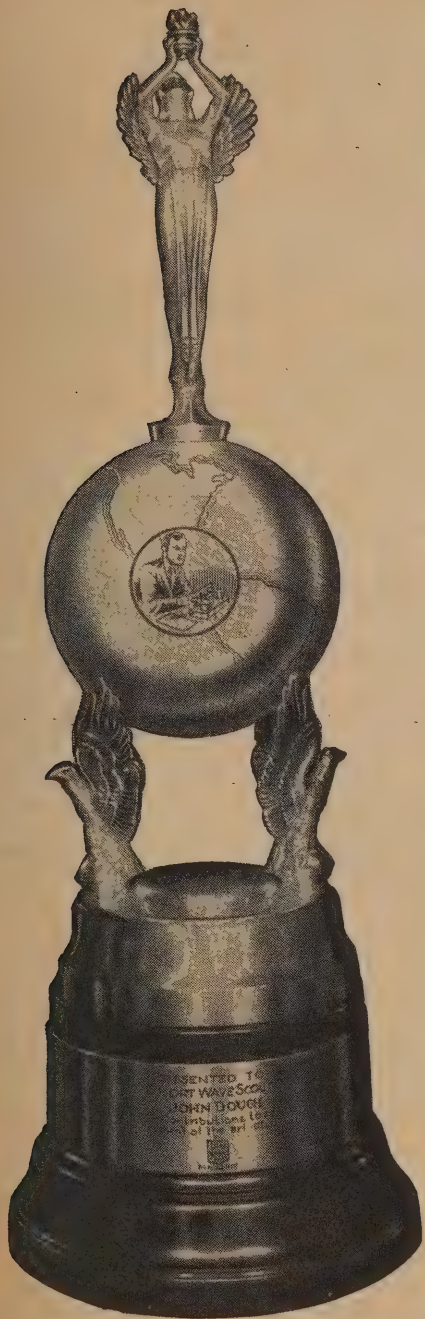
Bear in mind that the veri cards should be absolute verifications, and not simply an acknowledgment

that you notified a station that you heard them. Several stations do not verify, but simply send an acknowledgment card. Note that in either contest that only experimental, phone, or broadcast stations should be entered in your list. No amateur transmitters or commercial code stations can be entered. The contest for the March issue will close in New York City, Dec. 24th.

The judges in each contest will be the Editors of *Short Wave & Television* and the opinion of the judges will be final.

Send veri cards with your letter and oath certificate all in one package. Use a single line for each station and list them in a regular order, such as: frequency, schedule (all time should be reduced to E.S.T., which is five hours behind G.M.T.), name of station, city, country; musical identification signal if any.

Scouts



The handsome trophy which was designed by one of New York's leading silversmiths. It is made of metal throughout, except the base, which is made of black Bakelite. The metal itself is quadruple silver-plated, in the usual manner of all trophies today.

It is a most imposing piece of work, and stands from tip to base 22 1/2". The diameter of the base is 7 3/4". The diameter of the globe is 5 1/4". The work throughout is first-class. It will enhance any home, and will be admired by everyone who sees it.

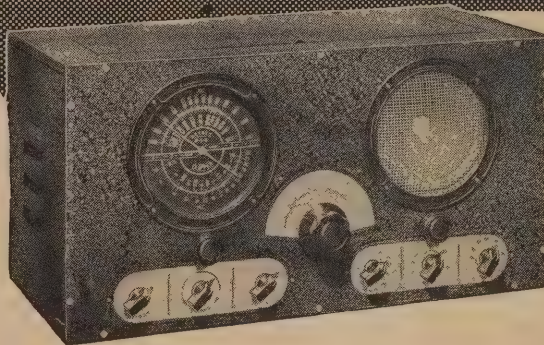
The trophy will be awarded every month to that SHORT WAVE SCOUT who has logged the greatest number of short-wave stations in each contest as explained elsewhere. The winner will be announced in the following issue of SHORT WAVE & TELEVISION. The winner's name will be hand engraved on the trophy.

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7 Tubes!
Bands!
THREE STAGES OF RADIO FREQUENCY AMPLIFICATION
Including

Built-In Signal Booster and Preselector!

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UNUSUAL DX RECEPTION

The SUPER-CLIPPER guarantees you consistent foreign reception, and goes further; you can expect the unusual in longdistance reception with this big record-breaking receiver. Big?—Yes, big in size and bigger in performance—19 inches wide, 10 inches high and 9 inches deep! No crowding of parts on its large, well-designed chassis. Efficiency dictated the mechanical and electrical layout of this superb set.

The SUPER-CLIPPER circuit utilizes both regeneration and super-regeneration combined with radio frequency amplification. The tube line-up is: 6K7 R.F. Booster; 6K7 R.F.; 6K7 Ultra-high R.F. (separate channel); 6J5G Detector; 6J5G 1st audio; 6L6G Power output; 80 Rectifier.

A Few of Many Features

Built-in Signal Booster and Preselector which permits foreign stations to be separated and weak ones built up to loudspeaker volume. Covers same range as main tuner, and is tuned automatically with it but may be switched out of

circuit for stand-by tuning and local high fidelity reception. Calibrated reduction drive tuning dial covering from 22 to .54 megacycles (13 to 555 meters) in four overlapping bands controlled by bandswitch (NOT plug-in coils).

Both electrical and mechanical bandspread entirely eliminating critical tuning on weakest foreign stations. A separate bandspread and ultra-high frequency condenser is used. Two stages of powerful audio amplification with 6L6 beam power output.

Separate ultra-high Frequency R.F. channel (3 to 12 meters) using air-wound coils and 6K7 R.F. amplifier. (Separate antenna connection is provided for maximum efficiency.)

Six one-half inch dynamic speaker; Noise and Tone Control; Earphone jack, etc.: The SUPER-CLIPPER has every worthwhile feature that you would like to have in your personal receiver.

The New 1938 Super-Clipper

complete with 7 tubes, ready to plug in to any 110 v. line and operate

\$29.75

Shipping weight 30 lbs.

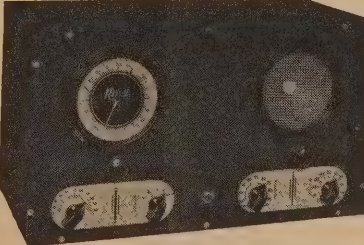
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UNIVERSAL CLIPPER



Uses the new 25L6 low voltage beam power tube which makes possible high power output with an inexpensive A.C.-D.C. power supply, operating from any type of 110-volt current. Here is the famous CLIPPER circuit, incorporated in an inexpensive receiver without sacrificing its distance-getting ability. The same smooth, non-critical tuning; combined regeneration and super-regeneration; separate bandspread and ultra-high frequency tuning condenser; bandswitch control; seven separate tuning bands; noise and tone control; 5 inch dynamic speaker; 3 to 555 meter tuning range; automatic earphone jack; in fact, all of the splendid features which make the CLIPPER circuit a tremendous success.

ASK THE MAN WHO OWNS A CLIPPER—LOOK AT HIS LOG!

COMPLETE KIT WITH ALL PARTS ASSEMBLED and wiring diagram; less only tubes and cabinet, **\$12.40** unwired

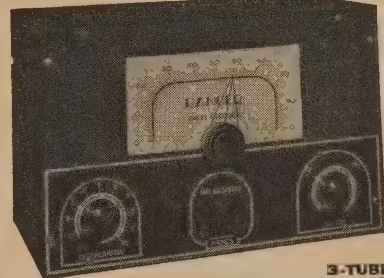
Black crackle finish cabinet..... **1.80**

Matched set of five tubes..... **3.20**

Wiring..... **2.90**

UNIVERSAL CLIPPER: complete, with black crackle cabinet (20" x 10" x 9"); five tubes; 6K7, 2-6J5G, 25L6, 25Z6G; ready to operate, and one-year guarantee. Special Complete Price..... \$19.50

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Crystallized metal cabinet..... **.90**
Set of three tubes (2-6J5G; 1-6A7)..... **1.35**
Wired and tested..... **1.40**
SPECIAL COMPLETE PRICE with all coils, cabinet and tubes, wired and tested with one-year guarantee..... \$8.25

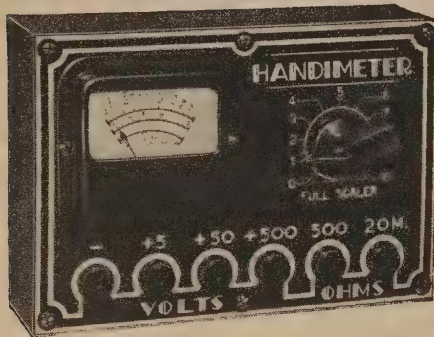


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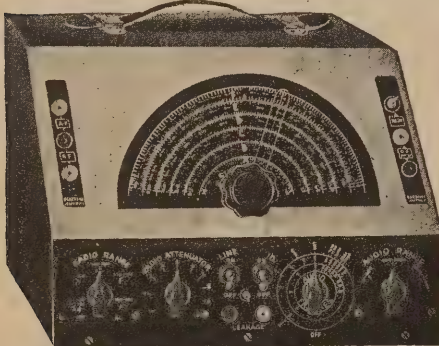
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1. (R.F.) Direct reading in frequencies, 100 kc-22 mc, in five bands, all fundamentals, by front-panel switching. Ultra band by harmonics to 105 mc, also direct reading.
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 4. Output meter for connection across primary of receivers' output transformer for peaking with modulation "on."
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 6. Condenser and other leakages tested to 100 megohms.
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 8. All services on 9-130 volts a.c. or d.c.
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Complete with Four Tubes



TUBE TESTER

Emission type perfected tube tester for all types of receiving tubes. Includes metal and metal-glass. Tests all 4, 5, 6, 7, 7L and octal base tubes, including diodes. Tests shorts and leakages. Accurate, simple, sturdy, direct-English reading (Bad? Good?).

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The New ACT-20 Transmitter

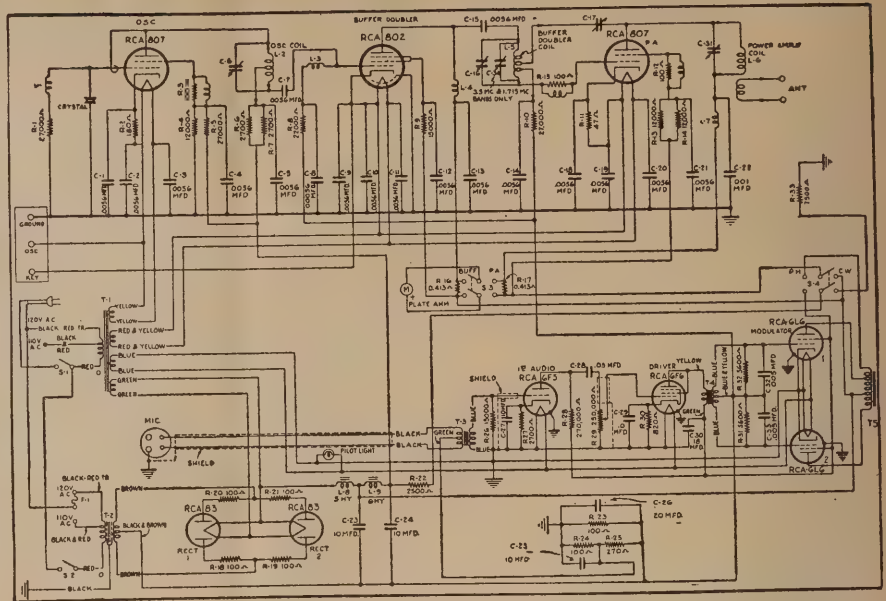


Diagram of ACT-20 Transmitter.

- ONE of the most compact, and extremely modern, amateur type transmitters so far designed is the ACT-20.

The set measures 24 5/8" long, 11 1/2" high, 12 1/2" deep, and weighs 64 lbs. The rated power output is 20 watts C.W. or 16 watts on phone. A double-button carbon microphone is suggested for use with it.

The R.F. system has been designed to make possible rapid changes of both frequency bands and frequencies within any band with a minimum of adjustment. This is accomplished by arranging the oscillator and buffer-doubler stage circuits so that coils and crystals of adjacent frequencies can be interchanged without the necessity of returning the plate circuits each time. The final amplifier stage is tuned in a conventional manner.

The completely crystal-controlled oscillator employs an 807 beam-power tube in a standard circuit. Special consideration has been given to the design of the tuned plate circuit. Tuning is accomplished by a small capacitor mounted on the chassis. This capacitor may be adjusted for a crystal frequency in the 1.715, 3.5 and 7.0 megacycle bands, and for several frequencies in a band, so that when its capacitance is less than that required for any other crystal, the oscillator will perform satisfactorily with all crystals without retuning. This means that any frequency may be used in any of these three bands by plugging in the proper crystal and coil and without further oscillator tuning. When a 14 mc. crystal is used, individual tuning adjustments are necessary.

The buffer-doubler stage consists of an 802 R.F. pentode employing special plate tuning, similar to that described for the oscillator, except that in the 1.715 and 3.5 mc. bands, an additional tuning capacitor is mounted in each coil form. These capacitors make it possible to operate on any frequency in these bands and in one other band, without retuning the buffer stage. This means that by adjusting both chassis and coil capacitors to an oscillator frequency or harmonic, no retuning will be necessary when shifting bands.

The final amplifier employs an 807 beam power tube as a Class C amplifier. The tuning capacitor for this stage is mounted on the front panel, providing the single-control

tuning feature of the ACT-20. The final amplifier is neutralized for maximum stability; this is accomplished by means of a specially designed adjustable condenser mounted on the chassis. A meter and selector switch are provided on the front panel, so that buffer-doubler or final amplifier plate current can be observed. The final amplifier is capable of delivering an average power output of 20 watts to the antenna. Coils are available for the entire 5 band range of the transmitter (1.715 to 30 mc.). The transmitter may be keyed in the buffer-doubler or final amplifier stage with the oscillator running continuously, or the oscillator may be keyed simultaneously with the other two stages. Keying of the oscillator alone is not recommended.

The modulator section of the ACT-20 single-chassis transmitter consists of an 6F5 high-gain speech-amplifier stage, a 6F6 audio-driver stage and a push-pull 6L6 beam-power modulator stage. The audio-amplifier gain control is readily accessible on the front panel.

A "Phone-C.W." switch connects the modulation transformer into the power-amplifier plate circuit for phone operation, and automatically provides the correct voltages for the 807 as a plate-modulated amplifier. In the C.W. position the switch disconnects the plate voltage from the speech amplifier, screen-voltage from the modulator and audio-amplifier and substitutes a bleeder resistor, which prevents the high voltage from rising to a value in excess of safe filter capacitor ratings for the key-up position.

The 6F5, high-gain speech amplifier, has a transformer input circuit for coupling to a double-button carbon microphone by means of a four-prong tube socket. Voltage for the microphone is supplied automatically when the plug is inserted in the socket. Other types of microphones or inputs may be used, provided they have an impedance of 500 to 600 ohms and have a level of about -35db.

The antenna coupling system consists of an integral coupling coil on each final-amplifier coil unit, and is so arranged that either a grounded system or transmission-line feed may be used. The most desirable type of radiator will depend on local conditions and frequencies used.

This article has been prepared from data supplied by the courtesy of the RCA Manufacturing Co.

Law Enforcement and Short Wave Radio

By Gerald Morris

(Continued from page 469)

it has been stolen. In numerous cases the cars are able to apprehend thieves before they have had time to dispose of, or even throw away, the money or goods they have stolen.

Many cities instead of using one-way short-wave communications have installed two-way systems using waves of the order of 10 meters, by means of which the cars are able to get into instant touch with headquarters, without having to find a telephone. This is a distinct advantage as it saves time in the event that an automobile containing criminals has left a location before the arrival of the police. We have conducted experiments along the lines of two-way communication in New York City and plans for installing it have been discussed to determine the efficiency of the available equipment and the practicability of same in a city of 312 square miles of land, 587 miles of waterfront and 6000 miles of streets.

Police have also investigated the possible use of television and facsimile equipment, and while some very interesting possibilities are apparent, I believe that for the time being New York will adhere to the eight state teletype system, which has given such satisfactory service over a period of years, and the police radio telegraph network in the midwest from the Gulf of Mexico to the Great Lakes, which was brought about through the Associated Police Communications Officers.

In closing, let me add that if any credit is given to the radio system in New York City, it should go to the splendid cooperation of every patrolman in the City, to our Police Commissioner, Lewis J. Valentine, who is not only our Police Commissioner but also our inspiration, and to Mayor LaGuardia, who has always given the Police Department his splendid support.

Human Ills Cured By New Short-Wave Technique

(Continued from page 472)

current passes through a coil composed of several turns of heavily insulated wire cable. A powerful magnetic field is thus set up in the vicinity of the coil and any part of the body subjected to this field will be acted upon accordingly. (Photos courtesy of Lepel High Frequency Laboratories.)

PCJ, Holland's, New Revolving Beam Antenna

(Continued from page 472)

of the track) on an iron pivot partly-sunk into a huge concrete block. In this way masts, carriers and bridge form one entity, able to turn on the iron pivot, and the aerials suspended from the masts can thus be directed in a few moments to any desired part of the world.

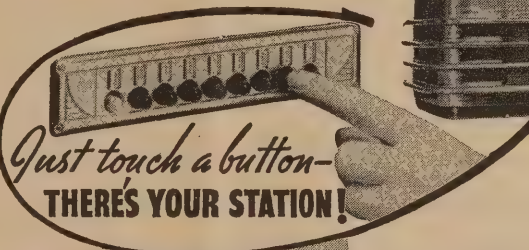
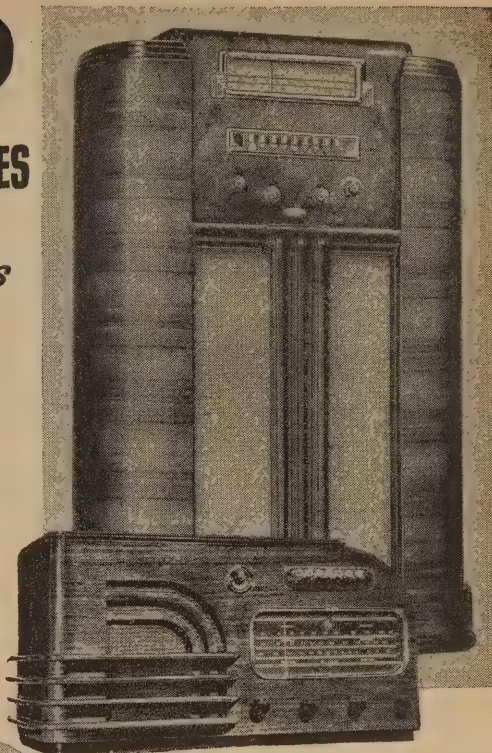
It is obvious that in this way it will be possible to direct the beam very precisely; in fact, it has been calculated that the power radiated by the beam will have the same effect as the radiation of a dipole aerial, operating with a power of 2,000 kilowatts!

For the time being, this experimental aerial-system will only be used on the 31-meter band, that is for countries situated to the South and Southwest of Holland, such as Africa and South and Central America, and when this experiment proves successful, other wave-bands will be equipped with an identical system of masts.

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Breting 14	108.00	21.60	7.75
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Robert Henry

W9ARA

by a metal baffle which surrounds the two sockets and the resistors and condensers. This shield is not shown as it was removed to permit a clear view of the arrangement. This shield is just as deep as the chassis and when the rig is mounted in the cabinet the entire under portion of the A.F. circuit is completely shielded. The tubes used are a 6N7 and a 6F6. The first is used as two stages of resistance-coupled amplification. This is in turn resistance coupled to the 6F6. There is more than enough gain to provide complete modulation of the 47. The output transformer is especially designed to couple a 6F6 to the grid of a grid-modulated amplifier. The output or secondary of the transformer is shunted with a 10,000 ohm resistor to improve operation. This amplifier is designed to work with a crystal microphone and, with such, will provide very good quality.

The plate voltages for the audio section are taken from the same supply as the oscillator and buffer. The same filament winding is also used. One might think that serious feed-back would be encountered; however if the circuit arrangement is followed as described no trouble will occur. Even heater by-passing condensers were not required, but if R.F. should get into the audio through this part of the circuit, they can be easily installed. The gain-control for the audio circuit, as well as the microphone jack, have their leads shielded. It would be better probably to use one of the new metal microphone connectors, this would provide more perfect shielding since the jack cannot be completely shielded without considerable difficulty.

High Voltage Supply

The high-voltage supply is conventional in all respects, except for the transformer which was discussed before. The filter in each supply contains a single choke and a two microfarad condenser. The photos here shown and the others reproduced with last month's article provide the constructional details. Careful examination of the inside view reveals that the two filter chokes are mounted one above the other, there not being sufficient space to mount both on the chassis. The line up of the controls as seen in the front view is as follows.—The two knobs at the top left are, left to right, the oscillator and buffer-doubler band-switching controls; the lower two at the left are for tuning the above two stages in the same order. The center knob below the meter is the meter-switch, and the right-hand dial is the final amplifier tuning control. Along the bottom we have from left to right—primary switch of plate transformer, filament primaries, buffer cathode switch, excitation control, phone-CW screen switch for final, A.F. gain, final filament center-tap switch,

A Desk-Type 10-80 Meter Transmitter

(Continued from page 497)

necessary for proper operation. Fixed screen voltage is used on the 47 final amplifier. This includes two taps on the voltage divider and a single-pole, double-throw switch in order that the voltage will be approximately 300 either on phone or CW. These taps are adjusted when the transmitter is in operation with the aid of a voltmeter.

The grid bias tap on the voltage divider which supplies bias to the RK-47 is adjusted for optimum performance for both phone and CW. This value is easily determined; that which gives best results for phone will work satisfactorily for CW. Due to the higher value of current the bias will be higher when the transmitter is used for CW operation.

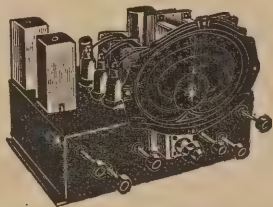
Audio Amplifier

The audio end of the transmitter is rather simple and the only "flea in the ointment" is getting it to behave. Much trouble may be experienced if a few precautions are not taken in the arrangement and construction of this unit. Metal tubes are used in the audio amplifier because of the excellent shielding thus permitted. These tubes are located right alongside of the final amplifier and any R.F. which might get into a tube less effectively shielded, would cause considerable trouble. The under view of the transmitter shows that the resistors and condensers associated with the amplifier are grouped together as far as possible. They are then further shielded

Bottom view of transmitter.

Meissner

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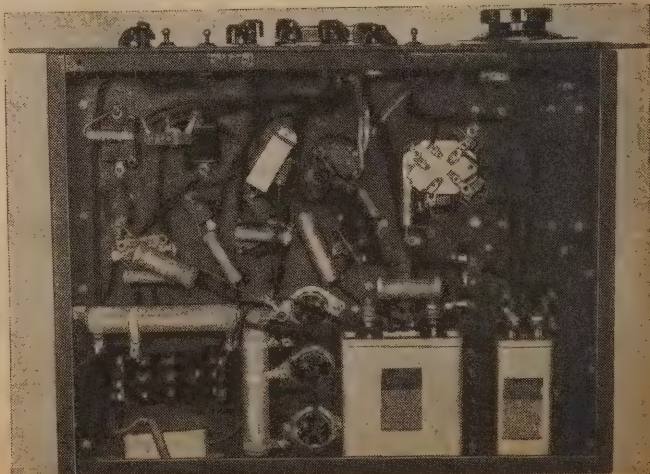


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microphone jack and finally the key jack.

A word as to performance—125 watts on CW is capable of working almost anything under favorable conditions; tests of the transmitter resulted in many DX contacts. On phone of course the power is only around 25 to 30 watts and many pleasant QSO's can be had when the bands are not too crowded. 75 meter phone seems to be the best bet for low-power short-haul QSO's.

Parts List Xmitter

KENYON

- 1—175 ma. 3-winding plate transformer
- 1—5 volt 3-winding filament transformer
- 1—5 volt-5 volt-6.3 volt filament transformer
- 2—170 ma. 20 henry filter chokes
- 1—6F6 to amplifier grid, modulation transformer
- 1—midget choke 30 henry 70 ma.

CORNELL-DUBILIER

- 3—.01 mf. mica condensers
- 2—10 mf. low voltage electrolytics
- 1—.1 mf. bypass condenser
- 2—8 mf. electrolytic condensers
- 1—2 mf. electrolytic condenser
- 1—2 mf. 2000 volt filter condenser
- 1—2 mf. 1000 volt filter condenser

I.R.C. (Resistors)

- 1—5 meg. $\frac{1}{2}$ watt resistor
- 2— $\frac{1}{4}$ meg. $\frac{1}{2}$ watt resistors
- 1— $\frac{1}{2}$ meg. $\frac{1}{2}$ watt resistor
- 1—3000 ohm $\frac{1}{2}$ watt resistor
- 1—500 ohm 1 watt resistor
- 1— $\frac{1}{2}$ meg. potentiometer
- 1— $\frac{1}{4}$ meg. potentiometer
- 1—20,000 ohm resistor, 2-sliders. 50 watt
- 1—1,500 ohm resistor, 1-slider. 50 watt
- 1—10,000 ohm resistor. 10 watt
- 1—10,000 ohm resistor. 1 watt
- 1—20,000 ohm resistor. 20 watt
- 1—50,000 ohm resistor. 50 watt

RAYTHEON

- 1—6F6 tube
- 1—6N7 tube
- 3—83 tubes

ASTATIC

- 1—Crystal Microphone (D-104)

World-Wide S-W Review

(Continued from page 476)

This unit, which can also be used in the adjustment of amateur transmitting rigs by adjusting the transmitter tuned circuits for maximum signal strength in a receiver as indicated visually on the meter, can be made in a few minutes from parts found in most amateurs' junk boxes.

The circuit is shown in the accompanying sketch. The calibration in R units can be accomplished in the way described in an item in this department in a recent issue of *Short Wave and Television*.

13-Tube Superhet Has Touch Tuning

(Continued from page 485)

tures, this superhet has continuous band coverage from 13.7 to 570 meters; "beam-power" push-pull output tubes with a rated output of 20 watts; R.F. pre-selection; high fidelity switch control; automatic audio compensation; a 12-inch super-dynamic speaker and separate bass-treble control. The receiver is encased in a tastefully designed modern console cabinet 41 $\frac{1}{4}$ " high, 24" wide and 14 $\frac{1}{4}$ " deep. (No. 670.)

This article has been prepared from data supplied by the courtesy of the Wholesale Radio Service Co., Inc.

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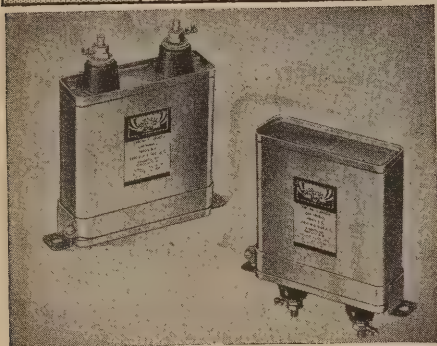


Portable Superhet 4

(Continued from page 483)

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question for patent reasons; it would call for room which an essentially portable design simply could not afford, and, further, for an extra 4 or 5 coils. Consequently, we designed the job for first detector input, assuring the receiver of a desirable input sensitivity by wiring the circuit here for grid-leak bias. The conversion is excellent with the 1D7G mixer, resulting in a high first tube efficiency, and both 1A6 and 1C6 replacements will work out almost as satisfactorily. Grid leak detection may seem a little out of the ordinary at this point, and straight grid bias, effected by returning the L1 circuit to minus three volts of C battery rather than direct to ground may appeal to some—and perhaps most—builders.

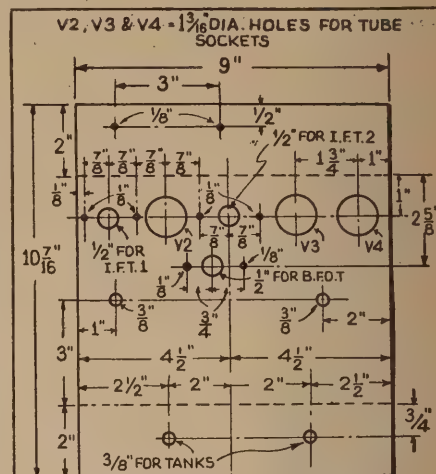
We have, note, employed audio control of volume; the alternative and equally satisfactory method is to replace the 0.5 meg. control potentiometer with a fixed resistor of similar value, and return the C minus lead for both the input and I.F. circuits to a .05 meg. potentiometer variable tap, the new pot. bridged across a 22.5 volt C battery.

Both first detector and front-end oscillator stages are *tank-tuned* by separately and manually adjustable .00014 mf. max. variable capacities; these condensers permit precise tracking throughout any given coil range, spot high frequency limits for narrow amateur, broadcast or other working bands, and afford fairly wide frequency coverage with each set of coils—reducing the number of such sets as will be required for all-wave tuning. *Band-spreading*, if effected through the use of a separate two-gang condenser of .00005 mf. maximum capacity per section; here we simultaneously tune both detector and oscillator stage circuits, with the amount of band-spreading being determined for an individual set of coils by connecting the spreader stators down on coil windings. The lower the stator leads tap down on the windings, the greater will be the band-spreading effect. As the tapping is done within the coil form, which is to say from winding to one form prong, the spreading may be nicely related to a desirable station separation and spreader dial coverage suitable to individual coil-set requirements. Thus the tap may be fairly low for 20 meter band spread—over the complete dial scale—or tapped down very little or not at all for 160 meter spread.

The single I.F. stage, with its screen-grid tube and *iron-core* input and output intermediate transformers, provides ample gain and selectivity. The frequency is 465 kc.—a very practical value—(if necessarily a compromise one) for good signal and image selectivity in an *all-wave* receiver.

Second detector-beat oscillator circuit: As we show it in the main diagram, this circuit departs somewhat from the conventional in its use of a pentagrid tube as a demodulator, beat note triode, and, of course, mixer. The signal circuit is grid-leak biased, and the output portion acts somewhat as a first A.F. amplifier, the sensitivity of the tube being nothing if not excellent, so long as certain precautions are taken in properly relating screen supply and plate voltages.

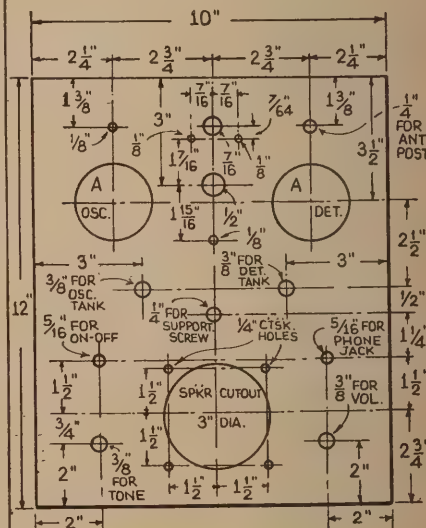
In the under chassis photograph no second detector plate audio choke is shown; it was added later to replace a plate resistor, which may be employed if the screen voltage is reduced in proper proportion to plate voltage. The choke, or rather plate impedance, if used, may be the secondary of any small (preferably push-pull) audio transformer. In this case the screen may tie directly to



NOTE:—BEND DOWN ON DOTTED LINES

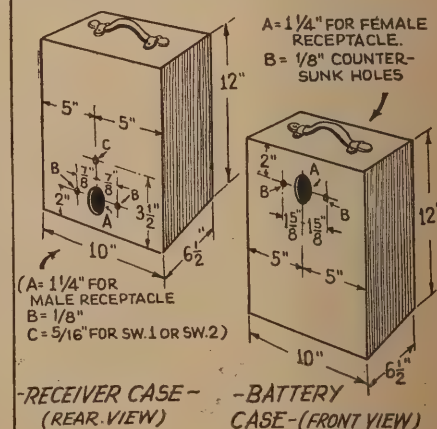
— CHASSIS LAYOUT —

A = 2 INCH DIA. HOLE FOR COIL



— FRONT PANEL LAYOUT —

DRILLING DATA FOR REAR RECEIVER PANEL AND FRONT BATTERY UNIT PANEL.



RECEIVER CASE — (REAR VIEW)

BATTERY CASE — (FRONT VIEW)

The drawings above show details of the chassis and other parts used in constructing the Portable Superhet-4.

45 or 67.5 volts B; where the plate resistor is used, it will be perhaps advisable to try out various values, not only for this plate resistor itself but for the second resistor which will be necessary between screen and B plus. Generally, 250,000 ohms as a plate resistor and 2 megs. for the screen drop from 135 volts B plus will work out satisfactorily.

The two mixer elements are used as grid and plate for the BFO (beat freq. oscillator) circuit. Here we follow conventional mixer procedure, the usual 50,000 ohm grid resistor connecting between the No. 1 grid to ground, the usual .0001 mf. grid condenser connecting between the No. 1 grid and the BFO coil grid lead, the plate lead for the coil connecting to the No. 2 grid or oscillator plate element. The second detector and BF oscillator circuits are electronically coupled within the tube, and the locally generated and tuned signals of course beat to provide the required audio note for CW reception and beacon spotting of weak broadcasters.

Choice of Output Tube: There is considerable choice as to selection of an output tube. For ourselves, we tried out the new 1G5G, found its 300 milliwatt output at least acceptable, liked its low drain (both plate and filament) and kept it in service. A 1F4 would have similarly low drain characteristics and would deliver 340 milliwatts at 135 volts plate supply (Filament drain 0.12 ampere, plate and screen total drain 10.6 ma.). A 1D4 would, with 180 volts B supply, afford 750 milliwatts output, and a type 33 as much as 1400 milliwatts at 180 volts B and 700 milliwatts at 135 volts B—but both tubes call for 0.26 filament ampere, with the '33 plate and screen drain as high as 27 ma. Frankly, if higher output is imperative, it would seem advisable to employ the newer type 1E7G, which we all know to be a push-pull pentode (a single tube with two sets of elements), filament drain 0.24 ampere, plate voltage 135, C voltage minus 4.5, output 1 watt, etc.—an ideal tube but one which naturally will require something in the way of preamplification of the A.F. signal.

Construction Details

It is no secret that special cases of heavy stock—that is, built to order and to precise layout specifications—would be relatively expensive when compared to the cost of available standards suitable for portable service. The particular cases we have used are available as such standards to West Coast builders, through local jobbing sources or direct from the manufacturer. But it is highly improbable that Eastern and Mid-Western manufacturers and distributors handle items of exactly similar dimension.

We must, of course, refer constructional details to the lab. model; but in giving layout data, we will do so with this comment: acquire cases as near the specified dimensions as possible, but don't go to the expense of having special boxes made if available jobs don't hit specifications exactly; instead, secure them of simply reasonably similar size and take such differences as may exist into consideration when following your own layout.

We do, in any event, suggest the use of the two independent units; this permits easy battery replacement, prevents shorting of battery leads to receiver chassis during transportation, affords plenty of necessary space for antenna wire, extra coils, headphones, tools and replacement parts storage—and on the whole makes possible a very sensible, practical design with portability very definitely featured.

The first thing to do is to arrange the various batteries (135 volts of B, 3 volts of A, and the required voltage of C) compactly within the one can and so that as much reserve space as possible may be had. Once



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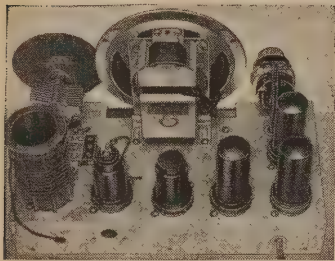
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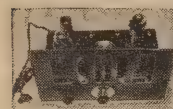
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this is done, a wooden partition may be fitted in just above these batteries, and the removable front panel then stamped or circle-cutter drilled to permit installation of the female receptacle for cable connection. The receptacle may now be wired to the batteries—the leads being left long enough so that the panel may be removed sufficiently well away from the cabinet to afford access to the items stored within.

The next job is to drill and stamp or cut the receiver unit front panel to layout specifications (our layout data will be satisfactory if your own box is at least as high, wide and deep as that used with our lab. model), then the back panel for the single opening for male cable receptacle installation.

Install the latter receptacle. Then acquire two shield cans (coil type, with removable base) of three inch diameter. Cut back their depth to 2¾ inches, open the round cut-out in the base to 2½ inch diameter, and solder the bases to the front panel so that they center properly around the two holes in that panel which we use for coil insertion. Solder them securely, by the way. Now stamp or cut holes in the back of the cans for installation of the retainer ring mounted coil sockets, install the sockets (five prong), place the cans over the bases already soldered to the front panel, and securely solder the cans to these bases. If all this is carefully done, a very rigid coil shield construction will result, sized properly for easy change of the knob-handled coils; and if lab. model parts specifications are followed and the retainer-ring mounted sockets are employed, there will be ample insurance against socket breakage with repeated coil insertion and removal, as the resilient concentric rings will take up the strain of the pulling out and pushing in of the forms.

The speaker may now be mounted on the front panel, preferably with a small wood baffle between it and the metal to prevent tinny reproduction. Next, volume and audio controls may be installed, along with the antenna and ground posts, the phone jack, and the three-pole single-throw jack switch.

The chassis must now be drilled and stamped; that used with the lab. model shows cutaway corners, as we had a very close fit to worry about; but specifications relate to a pan which should not require any such remaking for proper installation in a box no smaller, in any event, than that which we ourselves have employed.

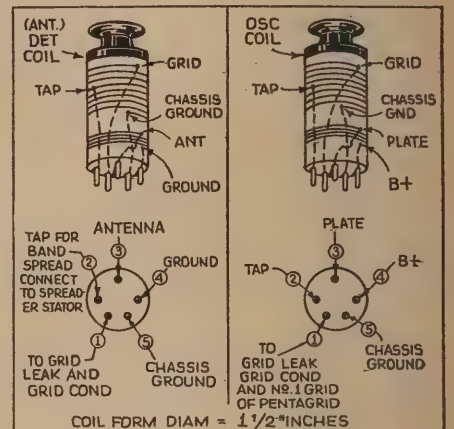
The band-spreading two-section variable condenser is mounted as shown, and see that it is positioned between the coil cans with the chassis assembled together with the front panel; its shaft should extend forward just far enough to permit insertion into the dial hub. (The dial should have been panel mounted, so that this extension may be at once determined.) The two tank condensers are now hung from the chassis top and in such position that their threaded mounting bushings extend out far enough to permit the securing of the nuts with front panel and small dial plates in place—yet not out so far that the nut which holds the condensers more or less in proper stator-rotor alignment will protrude beyond the front edge of the front chassis drop. I.F. transformers, sockets and other small items are now installed, and the chassis and front panel securely bolted together by means of the tank condenser bearing nuts, a single sturdy nut and bolt assembly positioned between the two tanks, and angle supports if such are deemed advisable by the individual builder.

Octal sockets, we might note, will serve throughout the line-up if 1-G type tubes are to be used; if, on the other hand, the 1A6, 1A4, 1A6, 33 or 1F4 or 1D4 older tubes are to be employed, socket requirements call for, respectively, a 6 prong job, a four, another six, and a five. A small

universal output transformer by the way, such as that one which may be secured separately from the manufacturer of the speaker and for use with this particular reproducer, will permit use of any of the several suitable output tubes except the 1E7G.

A five or six point screw terminal assembly should be installed against the rear chassis rear drop, elevated somewhat from this wall, of course, with hollow sleeves or spacers; this assembly will afford convenient termination for circuit element connection to points of common power supply.

The RF 1D7G or 1A6 is mounted below the chassis, horizontally, and in such position that the possibility of and the effects of a sagging filament will be considerably lessened. The socket for this tube is placed at the input I.F. transformer end of the chassis, so that the lead from the plate to the transformer may be kept short. Naturally, the tank tuning condenser near this point and the coil shield assembly above the condenser will be related to the oscillator stage, as the tube No. 1 and 2 grid terminals will be conveniently located for connection to these R.F. items.



Coil Connection Data.

Wiring

It is not exactly necessary to give many wiring details. If the parts have been placed as indicated, and if the circuit diagram with or without such changes as the alternative circuit drawings suggest or permit is carefully followed, proper wiring will more or less take care of itself. Just keep all leads as short as possible, bring returns for each stage to one convenient point, and solder your connections securely. Use one screw terminal assembly lug as a tie point for B plus, one for B screen (45 or 67.5 volts), one for power tube C minus, one for I.F. stage C minus (or both I.F. and R.F. C minus if the first mixer tube signal section is to be conventionally biased), one for A plus and one for B minus, A minus, C plus collectively; cable-tie the various terminals of the assembly to the on-off switch, actually connecting only those circuits here which are to be broken by the switch, of course, and then bring cable leads from this switch to the main cable male receptacle on the back panel—making sure the wiring is such as to permit removal of that panel for access to inside parts. Diagrams indicate how the coil sockets should be wired and the coils themselves wound and terminated. Be sure that the No. 7 terminals of the 1D5G and 1G5G (or the 1E7G, if that tube is used), connect to A plus. The second detector grid lead, we might advise in winding up this brief discussion of wiring, should come up through the chassis to the tube cap from the grid leak-grid condenser combination, which should be mounted on a tie point

conveniently near the green lead at the bottom of the output I.F. transformer.

The BFO transformer should have a *feed-back* winding, and if the particular unit which we have used in the lab. model (we acquired it not knowing that it was a single coil affair, tapped for electron-coupled circuits) is to be employed, this separate winding, consisting of about 100 turns of fairly fine wire, *scramble wound* (i.e. helter-skelter) and closely coupled to the other, must be added. It would, it seems, be better policy to avoid this extra work, which may in the end involve considerable experiment before proper oscillation and a beat note are effected, and simply acquire and use any small BFO transformer which features *tickler* feedback construction.

Adjustment and Operation

With the construction and wiring completed, and one set of coils built and plugged into place in the shield can assemblies, check *continuity* carefully, being particularly sure that all cable connections are as they should be. Then plug in the cable to connect the two units, turn the control switch on, and check for proper voltage readings at various points. Now line up the I.F. to exactly 465 kc. and adjust the *front end* tanks (which should track pretty well) until a signal is heard. Turn on the BFO switch (we might note that this switch may well be placed on the back panel, as it will be used infrequently, or that it might replace the power switch on the front panel, with the latter removed to the back) and adjust the BFO trimmer until a beat note results. The receiver should operate satisfactorily, and it should be now only necessary to build more coils for other bands and then experiment a little with the band-spread *tapping* until a proper spreading over the scale of the main control is effected. We have purposely omitted tap turns specification for the simple reason that most builders will have their own ideas as to how much spread will be desirable at particular frequencies.

In closing, may we advise that if the builder does not contemplate much use of the BFO feature—if he does not particularly care about the reception of CW, to be more explicit—he might just as well omit the refinement and substitute for the second 1A6 or 1D7G any triode, pentode, or diode-triode or diode-pentode, which will be satisfactory as a second detector. But these points should be clearly kept in mind where second detector and—we might add—audio changes are in any way contemplated:

1. First, a triode second detector, grid-leak biased, and coupled to any single section audio pentode with an ordinary midget A.F. transformer, will afford very sensitive rectification and excellent output.

2. Second, a pentode second detector, such as a 1B4, will be similarly sensitive, whether connected as a grid (grid-leak bias) or plate (straight grid bias) rectifier; but here a 250,000 ohm plate resistor and a 2 meg. screen to B plus resistor are recommended—the coupling from detector to output tube being the conventional network similar to that made necessary where the 1A6 is used.

3. A type '33 output tube will give excellent volume for speaker operation but will drain heavily on A and B batteries, will call for relatively high bias and drive, and may make necessary another tube as first audio and regardless of the type of second detector employed.

4. Where high output (1 watt) is required with economy of operation, the 1E7G recommends itself, but here again there may be difficulty in driving this tube to full out-

put without using a first audio tube (1H4G or equivalent).

5. The most sensible set-ups, all things considered, would seem to be—first, the arrangement we have used in the lab. model (where the beat oscillator feature is required); second, a triode detector, (grid-leak biased and transformer coupled to a 1F4 or 1G5G output tube) arrangement where fair output is desired and no beat note provision is imperative; and third, a diode-triode detector and first AF, (1H6G), 1H4G second AF and driver, and transformer coupled 1E7G set-up where 1 watt output and AVC control are in order and there is no objection to 5 tubes and increased drain on both A and B batteries.

PARTS FOR PORTABLE SUPERHET 4

SOCKETS, ETC.*

Two 5 prong statite sockets, with adapters and rings.
One 8 prong statite socket, with adapter, for V1 or one 6 prong if 1A6 or 1C6, used in V1 position.
Three 8 prong, chassis type moulded sockets, or one 4 prong and two 6 prong if older type tubes used instead of G.
Three tube shield bases

BRUSH

One pair crystal headphones

RHEOSTATS, ETC.*

One 2 ohm rheostat—R8
One open circuit phone jack
One three-pole single-throw jack switch (SW1)
One SPST switch (SW2) for BFO circuit
One 7 prong cable plug with 5-foot cable and male mounting receptacle
One 7 prong receptacle (female)
One .5 meg. potent. (R5) and one 15000 ohm tone potent. (R7)

LOUD SPEAKER*

One midget loud-speaker
One midget universal output transformer for above speaker

NAME PLATES*

Four knobs
One osc. cond. plate
One det. cond. plate
One volume plate
One tone control plate

HAMMARLUND

Two type HF-140 micro condensers (C1 and C2)
One type HFD-50 two-gang micro cond. (C3-C4)
One ICT-1 465 KC input I.F. trans—IFT1
One ICT-2 465 KC output I.F. trans—IFT2
One matching "tickler-type" BFO trans.—BFOT
Two CF-5 coil forms for each set of coils to be built
Two CS-3 coil shield, rebuilt to text specifications

NATIONAL

One type BM-1 dial

BINDING POSTS*

Two binding posts, one insulated for antenna connection

AEROVOX

Three type 284 .25 mf.—C11, C12, C19
Six type 284 .05 mf.—C9, C6, C7, C10, C18, C15
Four type 1467 .00025 mf. mica—C5, C15, C16, C17
Two type 1467 .0001 mf. mica—C8, C13

I.R.C.

One 1000 ohms, R3—two 50,000 ohms R6, R2—two 1 meg. Rr, R4—all above resistors half-watt, midget type, bakelite cased

MISC.:

Two cabinets, as near layout specification as possible; one chassis to fit; Two 2.5 mh. R.F. chokes (RFC 1 and 2) and one 16 mh. choke—RFC3
One Midget Push-pull transformer (secondary used only)

BATTERIES*

Three B batteries, two "A" batteries, one C battery as required

RAYTHEON

One set tubes, as required

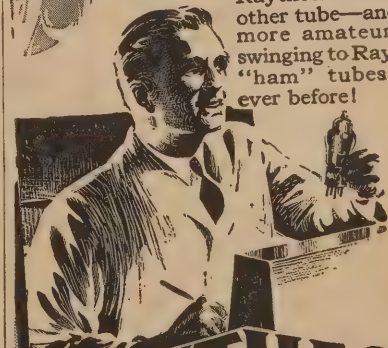
*Most Radio mail order houses can supply these items if properly identified as to title of article, issue (month) of *Short Wave & Television* and year.

PIONEERS IN THE DEVELOPMENT OF AUTO-RADIO TUBES



RAYTHEON pioneered the first outstanding tube developments that made home-like reception in auto-radios possible! Since then, Raytheon auto set tubes have been noted for their maximum life under adverse conditions—for their noiseless reception under extreme sensitivity! Raytheons, too, are especially designed and constructed for maximum life over the wide range of voltages in an automobile battery—to work efficiently in close proximity to each other—to withstand the jarring and pounding received on the roughest of roads.

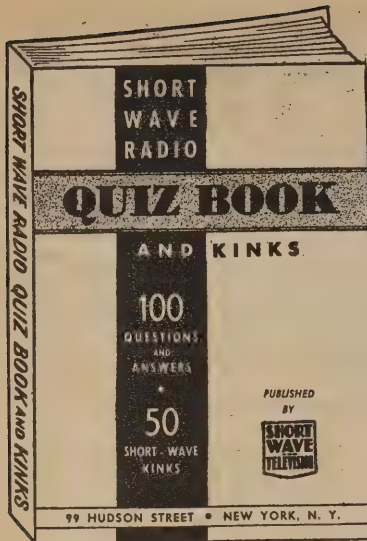
It is almost impossible to find a modern auto-radio not using the latest Raytheon development—the OZ4 rectifier! This fact is a universal tribute to Raytheon engineering. These are reasons why more auto-radio manufacturers use Raytheon than any other tube—and why more amateurs are swinging to Raytheon "ham" tubes than ever before!



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The book contains 64 pages with a heavy flexible colored cover. It measures 5½x8½ inches, and includes hundreds of photographs and diagrams. The contents are outlined below.

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How to Add an Audio Amplifier to a Small

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How to Connect an R.F. Stage Ahead of Your Present Receiver.
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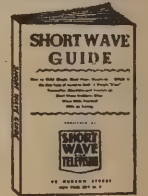
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SHORT WAVE GUIDE

Covers hundreds of Short-Wave questions and answers; illustrates popular Short-Wave kinks; gives instructions for building simple Short-Wave receivers; instruction on the best type of antennas to use; diagram and construction details for building a simple "ham" transmitter; practical hints on Short-Wave tuning.



COIL WINDING DATA

COVERAGE (Approx.)	L1	L2	L3	L4	Notes
10-20 meters	3	4	4	5	A
16-39	5	7	6	5	B
35-70	8	17	15	8	C
70-160	10	40	30	10	D
150-260	15	85	70	15	E
260-550	15	120	100	20	F

Coil form, (Hammarlund CF-5 type) diameter is 1½ in. diameter.

A: one inch L2 and L3 winding space, other windings close wound. Pri. and tickler (L1 and L4) about one quarter inch from L2 and L3.

B: one and one-fourth inch of L2 and L3 winding space, other data as for A.

C: close-wound, all windings, spaced apart as above for A and B. A variable padder of .006 mf. max. capacity may facilitate tracking at low frequency end of tuning range. This padder should be connected between the L3 inductance (lower end) and ground.

D: ditto as for C, with .005 mmf. approx. padder suggested for osc. circuit, where accurate tracking is more or less imperative.

E: ditto, with or without approx. .002 mf. padder.
F: ditto, without approx. .0004 mf. padder for osc.
Note: all windings may be of No. 24 D.S.C. copper wire.

Note: coverage is approximate only; minor departures from these specifications may be necessary, especially if no padders are used for osc. circuits. Padders may be installed within coil forms.

Note: the amount of band-spread for each coil will depend upon the placement of the C3 and C4 stator taps. Careful tapping will permit not only good spreading but will enable the det. osc. alignment to retain accuracy to close limits at least over the spreader dial tuning range.

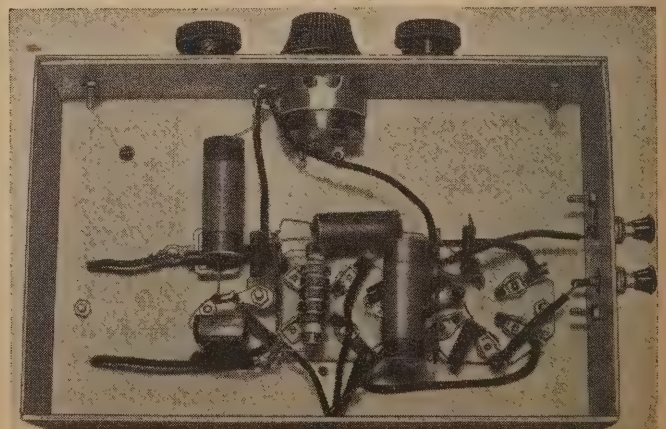
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● THE roar of a lion is majestic indeed! It is 100,000,000 times more powerful than what is required for the human ear to hear it. Engineers tucked away in sound-proof

are held within a half inch of the ear of a person of normal hearing, the acoustic power the ear receives is ten billion times greater than needed for mere perception of sound."

A 2-Tube Receiver for the Beginner

(Continued from page 481)



Bottom view of the 2-tube beginner's receiver, using the new 1.5 volt tubes.

Please mention SHORT WAVE & TELEVISION when writing advertisers

Short Wave League

(Continued from page 495)



Short Wave League

At a Directors Meeting held in New York City, New York, in the United States of America, the Short Wave League has elected

John F. Müller

a member of this League.

In Witness whereof, this certificate has been officially signed and presented to the above.

H. Winfield Secor
Club Secretary

This is the handsome certificate that is presented FREE to all members of the SHORT WAVE LEAGUE. The full size is 7 1/4" x 9 1/2". (See page 524.)

Here's Your Button

The illustration here-with shows the beautiful design of the "Official" Short Wave League button, which is available to everyone who becomes a member of the Short Wave League.

The requirements for joining the League are explained in a booklet, copies of which will be mailed upon request. The button measures 3/4 inch in diameter and is inlaid in enamel—3 colors—red, white, and blue.

Please note that you can order your button AT ONCE—SHORT WAVE LEAGUE supplies it at cost, the price, including the mailing, being 35 cents. A solid gold button is furnished for \$2.00 prepaid. Address all communications to SHORT WAVE LEAGUE, 99-101 Hudson St., New York.



A Folded Doublet for Transmitting

(Continued from page 499)

a doublet to a half-wave on the desired frequency and bend it back against itself as shown in the diagram. For example, on 10 meters each leg is 8 ft. 3" long. The feeders used at this station consist of a length of RCA cable that was originally used for a doublet receiving antenna. I believe that the diagram will be easily understood.

Harold B. Rhodes, W2IKW.

100 Watt QRM Dodger— A Compact 5-Meter Transmitter

(Continued from page 499)

Coil Data for 100-Watt Transmitter

	Turns	Length Winding	Diameter	Wire
Osc. plate....	4	1/2"	1/2"	No. 12
Buffer				
Plate	6	1 1/4"	1"	No. 12
† Amp. grid..	11	3/8"	1 1/2"	No. 12
Amp. plate	7	1"	2"	No. 12

*Tapped 3/4 turn from B—

†Mounted inside of amplifier grid coil.

Book Reviews

RADIO ENGINEERING, by Frederick E. Terman, Sc.D., Second Edition. Cloth bound; size 6 1/4" x 9 1/4"; 814 pages; 475 illustrations; copious index by names and by subjects. Published by McGraw-Hill Book Co., New York City.

One of the finest "tools" to put into the hands of a radio student and the engineer, no matter how advanced he may be, is a good text-book on the subject. So many poorly written books or incomplete treatises have been published on the subject of radio that it is a treat, indeed, to look through this second and enlarged edition of Professor Terman's work.

Some radio text-books have been so full of mathematics that the average student, especially those who study at home, could gain but little help from the text, but Professor Terman has the happy faculty of explaining the various subjects so that practically anyone can understand them as here presented.

Vacuum tubes are the backbone of radio today and Prof. Terman covers this subject in a very complete manner, including the fundamental properties of vacuum tubes.

Another very important subject for radio students is the various actions taking place in resonant circuits, and it seems that we can never learn too much about this subject. Vacuum tube amplifiers is another "mile-post" in radio technique and one which must be thoroughly understood by the student as well as the engineer. This class of amplifiers, including power amplifiers and radio transmitters are covered at great length, with graphic diagrams and formulas wherever necessary. Vacuum tube oscillators are discussed in a comprehensive manner, including the various type of circuits such as the Hartley, Colpitts, etc., with diagrams.

Antennas have been covered in a refreshing way by the author, with some new diagrams showing the radiation patterns of various directive forms of aerials, and the propagation of waves receives a liberal treatment. Radio receivers are adequately covered, while later chapters deal with the important subjects of Radio Aids to Navigation, Television (including a diagram for a complete Television System), Sound and Sound Equipment, etc.

Formulas for the calculation of inductance and capacity are also given in a special appendix.

An up-to-date radio engineering text-book which should be on every library book-shelf.

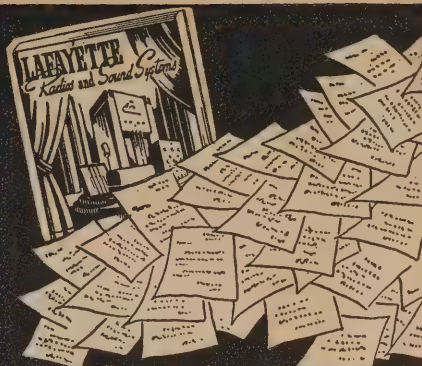
THE CAUSES AND ELIMINATION OF RADIO INTERFERENCE, by Joseph Everett Foster. Cloth covers, 4 1/4" x 7"; 152 pages, illustrated with half-tones and diagrams. Published by C. W. Nelson Co., So. Braintree, Mass.

If there is any one subject in the realm of radio which has been sadly neglected, it is the prevention of interference. Mr. Foster has prepared this very valuable and interesting book intended for radio engineers, dealers, servicemen, and in particular, those having to deal with interference troubles on service lines operated by electrical light and power companies.

A brief resume of the principles of radio are given in the first part of the book and a description of the apparatus for locating noise and circuit faults. Later the writer takes up the subject of radio interference caused by electric light and power lines. One chapter deals with radio interference caused by 2,300 and 4,400 volt distribution feeder primaries. Possible causes of interference such as leaks in transformers, loose fuse plugs, break-down of insulation, etc., are discussed and methods of locating also. The great value of this book lies in the fact that the author describes in elaborate detail typical "hunts" for interference trouble and the final cause of the trouble as discovered by means of a sensitive locating apparatus. Radio interference caused by high voltage transmission feeders has a chapter to itself and this is a very important subject, owing to the possibility of leakage on such high voltage lines. Street lighting circuits as a source of interference, underground cables, etc., are also discussed.

Ham DX Contest

● A DX contest for amateur stations has been arranged by the Radio Club of Venezuela, at Caracas. The first half of the contest, for C.W. only, begins at Midnight, January 14, and continues for four days. The second half, for phone transmission, begins at midnight, January 21, and lasts the same length of time as the first. The operators getting acknowledgments from the greatest distances will be declared the winners. More than 200 Venezuelan amateurs will be on the air almost continuously during this eight-day period, offering a good chance for logging a large number of stations in this country.



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- ★ THIRD PRIZE (\$100.00) CLINTON L. KINZEY
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and 50 others who won \$10.00 each

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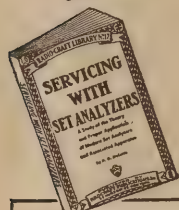
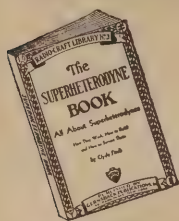
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Short Wave Scouts

(Continued from page 502)

DZH, 14,460 kc., Der Deut. Kurzwel, Berlin.
DJB, 15,200 kc., (as above).
DJQ, 15,280 kc., (as above).
DZB, 10,042 kc., (as above).
DJD, 11,770 kc., (as above).
DJC, 6,020 kc., (as above).
DJH, 9,840 kc., (as above).
DFB, 17,520 kc., Nauen, Germany.
DAF, 13,100 kc., Norddeich-Radio, Germany.
DGH, 10,440 kc., Nauen, Germany.
DOAH, 12,325 kc., "S.S. Bremen."
HBP, 7,797 kc., Radio Nations, Geneva, Switzerland.
HBF, 18,450 kc., (as above).
HBL, 9,595 kc., (as above).
HBO, 11,402 kc., (as above).
HBJ, 14,535 kc., (as above).
ORK, 10,330 kc., Radio Ruyssede, West Flanders, Belgium.
HAS3, 15,370 kc., Station of the Royal Hungarian Post, Budapest, Hungary.
HAT4, 9,125 kc., (as above).
PHI, 11,730 kc., Philips' Radio PHOHI Studios, Hilversum, Holland.
SMSSX, 11,705 kc., Royal Technical University, Stockholm, Sweden.

Let's Listen In With

Joe Miller

(Continued from page 489)

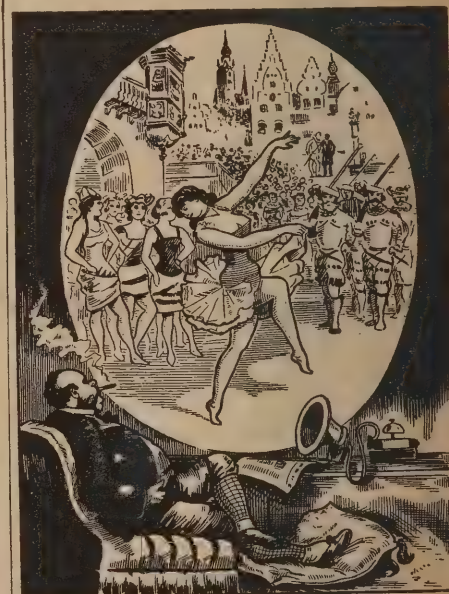
Other DX on 10 meters is SP1HH, Poland, HA4A, Hungary, ON4FE, Belgium, all heard here, and SM5OI, Sweden, OK3VA, Czechoslovakia, all heard in L.F. end of 10 meter band.

Max Bass, W2, reports hearing LA1F, Norway, SM7QC, Sweden, on 20 meters.

Other DX here on 20 meters: CT2AB, 14.36, Azores, 3:45 p.m., ZBAL, 14.05, Malta, at 4:35 p.m., and OX2QY, Greenland.

Regarding OX2QY, many readers are wondering where to write for QSL's. Address reports to W2QY, who is radio "op," and when he returns he will QSL all reports.

OX2QY operates on 14,368, and is located at Reindeer Point, near Etah, Greenland, and the antenna used is a 35 foot high rhombic, accounting for OX2QY's excellent R9 signal. Occasionally 12.46 is used for hookups with NBC. Thanks to George Pasquale, W8OQU, for much of this FB dope.



TELEVISION IN 1869

A contemporary of Jules Verne, the well-known European artist A. Robida, in the year 1869 published the drawing which is reproduced herewith. The television scene shows a ballet from the opera "Faust."

Articles Wanted

● The Editors are looking for good construction articles on "Ham" and "Fan" sets, including receivers and allied apparatus. Our readers are anxious to know about new circuits which you may have devised. Just because the set may only have 2, 3 or 4 tubes, there is no reason why you should think it unimportant.

Be sure to write the Editors and give them a brief description of your particular circuit; if they are interested, they will inform you promptly, so that you can prepare an article and take photos of the set. Otherwise, the set can be sent to the Editors and they will photograph it.

World Short-Wave Stations

(Continued from page 500)

5.030	HJ4ABP	MEDELLIN, COL., 49.75 m. 8-11 pm.	5.890	JIC	TAIHOKU, FORMOSA, 50.93 m. Works Tokio 6-9 am.
5.030	HP5B	PANAMA CITY, PAN., 49.75 m., Addr. P.O. Box 910. 12m-1 pm., 7-10.30 pm.	5.885	HCK	QUITO, ECUADOR, 50.98 m. 8-11 pm.
5.030	VE9CA	CALGARY, ALTA., CAN., 49.75 m. Thur. 9 am.-2 am.; Sun 12 m.-12 m.	5.875	HRN	TEGUCIGALPA, HONDURAS, 51.06 m. 1.15-2.16, 8.30-10 pm.; Sun 3.30-5.30, 8.30-9.30 pm.
5.030	OLR2B	PRAGUE, CZECHOSLOVAKIA, 49.75 m. (See 11.875 mc.)	5.855	HI1J	SAN PEDRO DE MACORIS, D. R., 51.25 m., Addr. Box 204. 12 m.-2 pm., 6.30-9 pm.
5.025	HJ1ABJ	SANTA MARTA, COL., 49.79 m. 11.30 am.-2 pm., 5.30-10.30 pm. except Wed.	5.853	WOB	LAWRENCEVILLE, N. J., 51.26 m., Addr. A. T. & T. Co. Works Bermuda nights.
5.020	DJC	BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 10.40 am.-4.30, 4.50-10.45 pm.	5.850	YV1RB	MARACAIBO, VEN., 51.23 m., Addr. Apartado 214. 8.45-9.45 am., 11.15 am.-12.15 pm., 4.45-9.45 pm.; Sun. 11.45 am.-12.45 pm.
5.020	XEUW	VERA CRUZ, MEX., 49.83 m., Addr. Av. Independencia 98. 8 pm.-12.30 am.	5.830	TDD	SHINKYO, MANCHUKUO, 51.46 m. Works Tokio 6-9 am.
5.018	ZHI	SINGAPORE, MALAYA, 49.18 m., Addr. Radio Service Co., 2 Orchard Rd. Mon., Wed. and Thu. 5.40-8.0 am., Sat. 10.40 pm.-1.10 am.	5.830	TIGPH	SAN JOSE, COSTA RICA, 51.5 m., Addr. Alma Tica, Apartado 800. 11 am.-1 pm., 6-10 pm. Relays TIX 9-10 pm.
5.015	HISU	SANTIAGO DE LOS CABALLEROS D. R., 49.88 m. 7.30-9 am., 12m.-2 pm., 5-7 pm., 8-9.30pm; Sun. 12.30-2, 5-6 pm.	5.813	TI2H	SAN JOSE, COSTA RICA, 51.59 m., Addr. Senor Gonzalo Pinto, H.
5.012	HJ3ABH	BOGOTA, COL., 49.91 m., Addr. Apartado 565. 12 n.-2 pm., 6-11 pm.; Sun. 12m.-2 pm., 4-11 pm.	5.800	YV5RC	CARACAS, VEN., 51.72 m., Addr. Radio Caracas. Sun. 3.30am.-10.30 pm. Daily 7-8 am., 10.30 am.-1.45 pm., 3-45-10.30 pm.
5.010	COCO	HAVANA, CUBA, 49.92 m., Addr. P. O. Box 98. Daily 7.55 am.-12m., Sun. till 11 pm.	5.790	JVU	NAZAKI, JAPAN, 51.81 m. Irregular.
5.010		TANANARIVE, MADAGASCAR, 49.92 m., Addr. (See 9.53 mc.), 12.30-12.45, 3.30-4.30, 10-11 am.	5.780	OAX4D	LIMA, PERU, 51.9 m., Addr. P. O. Box 853. Mon., Wed. and Sat. 9-11.30 pm.
5.010	CJCX	SYDNEY, NOVA SCOTIA, 49.92 m., Relays CJCX 7 am.-1 pm., 4-8 pm.	5.770	YV2RA	SAN CRISTOBAL, VENEZUELA, 51.96 m., Addr. La Voz de Tachira. 11.30 am.-12 n., 5.30-9 pm., Sun. till 10 pm.
5.005	HP5K	COLON, PAN., 49.96 m., Addr. Box 33. 7-9 am., 11.30 am.-1 pm., 6-11 pm.	5.758	YNOP	MANAGUA, NICARAGUA, 52.11 m. 8-9.30 pm.
5.005	CFCX	MONTREAL, CAN., 49.96 m., Can. Marconi Co. Relays CFCF 7.45 am.-1 am.; Sun. 10 am.-12.15 am.	5.740	TGS	GUATEMALA CITY, GUAT., 52.26 m. Wed., Thur. and Sun. 6-9 pm.
5.005	VE9DN	DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co. Sat. 11.30 pm.-2 am.	5.730	HC1PM	QUITO, ECUADOR, 52.36 m. Irregular 10 pm.-12 m.
5.000	CXA2	MONTEVIDEO, URUGUAY, 50 m., Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 10.30 am.-10.30 pm.	5.720	YV2RB	SAN CRISTOBAL, VEN., 52.45 m., Addr. La Voz de Tachira. 6-11.30 pm.
5.000	ZEA	SALISBURY, RHODESIA, S. AFRICA, 50 m. (See 6.147 mc., ZEB.)	5.500	TI5HH	SAN RAMON, COSTA RICA, 54.55 m. Irregular 3.30-4, 8-11.30 pm.
5.000	RV59	MOSCOW, U.S.S.R., 50 m. Irregular. 3-6, 10.15-10.45 pm.	5.145	PMY	BANDOENG, JAVA, 53.31 m. 5.30-11 am.
5.990	XEBT	MEXICO CITY, MEX., 50.08 m., Addr. P. O. Box 79-44. 8 am.-1 am.	5.077	WCN	LAWRENCEVILLE, N. J., 59.7 m. Addr. A. T. & T. Co. Works England late at night irregularly.
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5.970	HJ4ABD	MEDELLIN, COL., 50.26 m., Addr. La Voz Catia. 8-11.30 pm.	5.025	ZFA	HAMILTON, BERMUDA, 59.7 m. Works N. Y. C. irregularly at night.
5.968	HVJ	VATICAN CITY, 50.27 m. 2-2.15 pm. daily; Sun. 5-5.30 am.	5.000	TFL	REYKJAVIK, ICELAND, 60 m. Works Europe nighttime irregularly.
5.950	HJN	BOGOTA, COL., Radiodifusora Nacional, 50.42 m. 6-11 pm.	4.975	GBC	RUGBY, ENG., 60.3 m. Works ships irregularly.
5.940	TQ2X	GUATEMALA CITY, GUAT., 50.5 m. 4-6, 9-11 pm.; Sun. 2-5 am.	4.836	HJ3ABD	BOGOTA, COL., 62 m., Addr. La Nueva Granada, Box 599. 12 m.-2 pm., 7-11 pm., Sun. 5-9 pm.
5.930	YV1RL	MARACAIBO, VEN., 50.59 m., Addr. Radio Popular, Jose A. Higuera M., P. O. Box 247. Daily 11.43 am.-1.43 pm., 5.13-10.13 pm.; Sun. 9.13 am.-3.13 pm.	4.820	GDW	RUGBY, ENG., 62.24 m. Works N.Y.C. nighttime irregularly.
5.925	HH2S	PORT-AU-PRINCE, HAYTI, 50.63 m., Addr. P. O. Box A103. 7-9.45 pm.	4.810	HJ2ABC	CUCUTA, COL., 62.34 m. La Voz de Cucuta, 8 pm. to 12 m.
5.917	YV4RP	VALENCIA, VEN., 50.71 m. Irregular.	4.807	HJ1ABB	BARRANQUILLA, COL., 62.39 m., La Voz de Barranquilla, Addr. P. O. Box 715. 11.30 am. to 1 pm., 4.30-6 pm.
5.900	ZNB	MAFEKING, BRI. BECHUANALAND S. AFRICA, 50.84 m., Addr. The Govt. Engineer, P. O. Box 106., Daily 1-2.30 pm., 1.15-2 am.	4.790	VE9BK	VANCOUVER, B. C., CAN., 62.63 m. Addr. Radio Sales Service, Ltd., 780 Beatty St. Except Sun. 11.30-11.45 am., 3-3.15, 8-8.15 pm.
5.900	TIMS	PUNTARENAS, COSTA RICA, 50.85 m. 6-10 pm.	4.752	WOO	OCEAN GATE, N. J., 63.1 m., Addr. A. T. & T. Co. Works ships irregularly.
5.898	YV3RA	BARQUISIMETO, VEN., 50.86 m., Addr. La Voz de Lara, 12 m.-1 pm., 6-10 pm.	4.600	HC2ET	GUAYAQUIL, ECUADOR, 65.22 m. Addr. Apartado 249. Wed. and Sat 9.15-11 pm.
			4.272	WOO	OCEAN GATE, N. J., 70.22 m., Addr. A. T. & T. Co. Works ships irregularly.
			4.250	RV15	KHABAROVSK SIBERIA, U. S. S. R., 70.42 m. 1-10 am.



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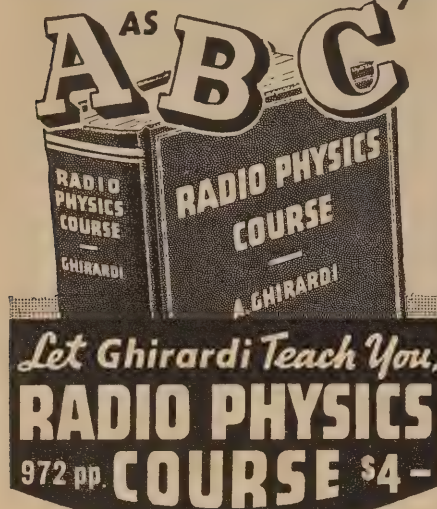
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● OF outstanding significance in the development of ultra-high frequency equipment is the transition from self-excited frequency modulated transmitters to the highly stabilized equipment afforded by crystal control. This transition has been taking place for some time, but it was only recently that the many advantages of crystal control at these high frequencies have been fully realized.

It is now a well established fact and has been proven in numerous tests, that greater distances and more reliable communication is possible, with a given amount of power, through the use of very stable radio frequency equipment. This is due largely to two obvious improvements: first, because the concentration of carrier power on a single frequency has the result of increasing the transmitter's effectiveness several times over that of a self-excited modulated oscillator of equal power output, and second, because of the fact that the more sensitive superheterodyne receiver can be employed.

The use of highly stable 5-meter transmitters is not only desirable and worthwhile from the standpoint of increasing the number and reliability of contacts, but also from the standpoint of interference. This

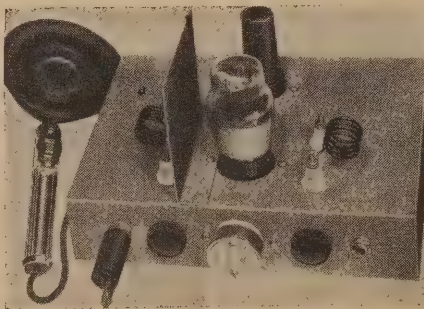


Fig. F. Simple 1-Tube (R.F.) 5-meter transmitter, with Bliley crystal frequency control. No. 671.

latter consideration is particularly important in the larger cities where 5-meter activity is comparable to that found in the lower frequency bands.

DEVELOPMENT: Heretofore, the application of crystal control to 5-meter transmitters has been limited by the fact that the necessary frequency multiplying schemes seriously complicated the design and construction. The development of the now well-known HF2 20-meter crystal unit was an important step in the right direction but transmitter simplicity was still wanting. With this in mind, a program of investigation and research was instituted in an attempt to develop a practical 10-meter quartz crystal.

The characteristics of existing types of crystals were unsatisfactory for these high frequencies and the development of a new cut was necessary. After ex-

Fig. D. This "prof." looking 18 watt, 5 meter transmitter will interest every "Ham"; it's perfectly stabilized by crystal control.

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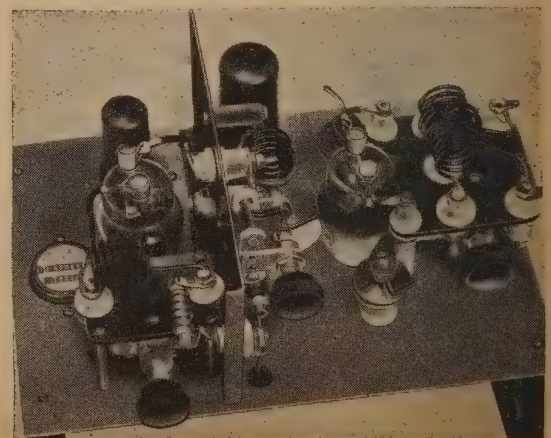
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tended research, a new angle was found in which the crystal was thicker, for a given frequency, than other cuts and at the same time possessed the necessary high activity. It will safely carry an RF current of up to 200 mils without danger of fracture and has a drift of 43 cycles/Mc/°C.

This new crystal, complete with holder, is the Bliley HF2 10-meter crystal unit. It is indeed a revolutionary development for it is now possible to have 5-meter crystal control which is really simple—so simple that it can be easily applied to portable and mobile equipment.

TUBES: In applying crystal control to high frequency transmitters, the problem resolved itself not only into the development of the crystal, but, also, to the selection of tubes which had the proper characteristics for efficient crystal performance. With some tubes, especially the higher mu and pentode types, the crystal was effectively shorted by



the high input capacity. Others, having a low feed-back capacity and a large electrode spacing, were equally unsatisfactory. Pentodes, in general, are not to be recommended and best results were obtained with the new high frequency triodes such as the 955, 6J5G, 6E6 and RK34.

The 955 and 6J5G are excellent oscillators, giving $1\frac{3}{4}$ and $2\frac{1}{2}$ watts output, respectively, on 10-meters. The 6J5G has slightly higher inter-electrode capacities but is preferable to the 955 because of the higher output and lower cost. Either of these tubes will give sufficient output at 10-meters in a simple triode oscillator circuit, to drive an 802, RK23, 807, RK39, or 6L6 tube as a doubler.

The 6E6 and RK34 tubes are particularly interesting since their dual-triode construction makes possible good 5-meter output with a single tube. The 6E6 gives an output of 3 watts on 5-meters from the doubler section, while the RK34 will give an output of $3\frac{1}{2}$ watts.

CIRCUIT CONSIDERATIONS: At these high frequencies, careful consideration must be paid to the design and construction of the transmitter. Low-loss construction must be used throughout, with the parts so arranged as to facilitate short direct leads, and, at the

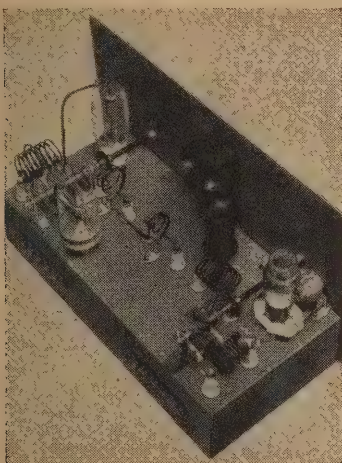


Fig. E. This swell looking 60-watt 5-meter transmitter, was developed by the Bliley engineers and a description of it is given in the accompanying text.

same time, to permit the individual circuits to be shielded and isolated as much as possible. If sub-base or chassis construction is used, all grounds should be tied to a common bus and the bus strapped to one point on the chassis to eliminate the possibility of closed loops and circulating currents in the ground system. Parallel feed should not be used due to the absence of a real good choke at these frequencies. This means that the tuning condenser will be at high voltage and must be insulated from ground. An alternative method, which is often used at the lower frequencies, is to ground one side of the condenser and insert a by-pass condenser in the tank circuit. This arrangement should not be used since the impedance and losses of a mica condenser is considerable at these frequencies and if it is required to carry the circulating tank current, there will be a serious loss in power output.

For maximum power output, a high-C tank circuit should be used in the crystal oscillator. This is necessary since the recommended tubes have a low plate impedance, and is advantageous in that the stability will be greatly increased as compared to the use of a low-C tank.

PRACTICAL CIRCUITS: Standard crystal oscillator circuits for use with HF2 10-meter

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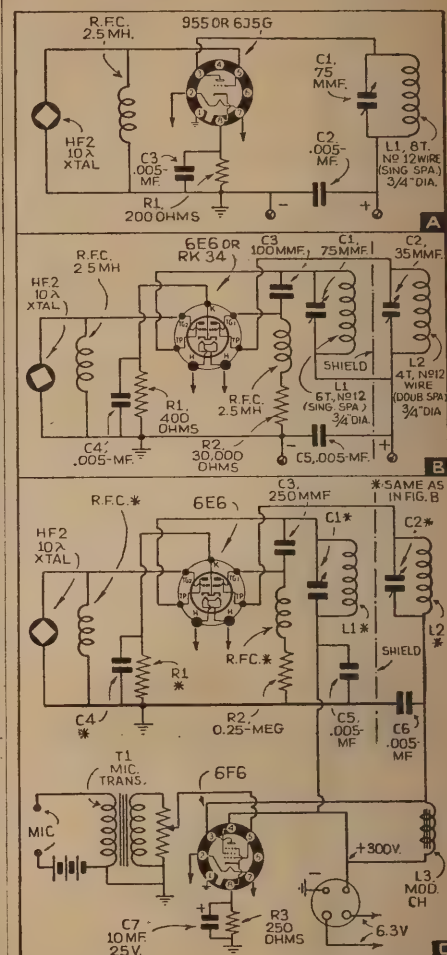
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crystal units are shown in Figures A and B. The circuits are conventional but all values indicated should be adhered to as closely as possible as these have been found to give best output and highest stability. The construction and layout of two simple 5-meter crystal controlled transmitters is pictured in



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See the new "Barter and Exchange" Free Ad Department on Page 527

A 4-Band, Three-Tube Superheterodyne Receiver

(Continued from page 484)

necessary is to discard the metal front at a few cents expense. This panel shields, is sturdy. If you are using a metal rack it is necessary to look closely to discover that wood is used. The only wood showing is at the ends which are painted black to resemble the metal. The top panel is turned over and painted so as to hide the wood there.

Construction: First, get the piece of plywood 8 by 24 inches. It is $\frac{3}{4}$ inch thick, five-ply, and is carried in stock by lumber companies in sheets 24 inches wide. It will only be necessary for them to cut off an 8 inch piece from a sheet.

Preparing the front: Get the metal front of number 20 gauge iron and measure and mark places for the control holes. After drilling the holes paint the panel black crackle and lay it away a few hours to dry. Crackle paint that dries in air is relatively inexpensive and you soon can become expert in turning out a beautiful job. I use a brush and flow it on thick (only one coat) after experimenting on a couple of pieces of scrap panel.

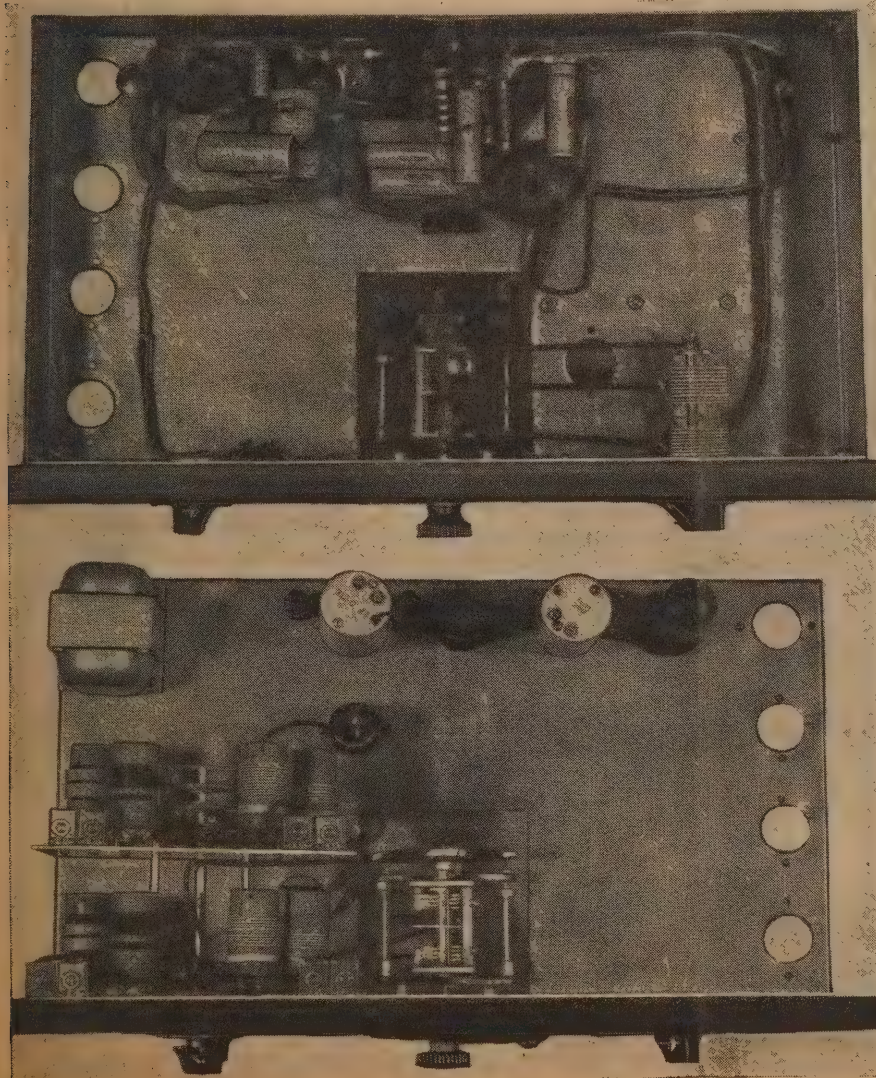
Escutcheons: The escutcheons are metal washers $1\frac{1}{8}$ inch outside diameter with a quarter-inch rim. They may be purchased

at a specialty hardware house. They are then painted white and marking on them is done with India ink. The band-switch has four colors painted on it, one for each band.

The Dial: The dial is one of the features of the set. It is revamped from an old Radiola Semi-Portable superhet. These dials are obtainable for a song from salvage houses, but, if that is impossible, it would not be difficult to construct it. Only one of the conveniences of this dial is the ease of removing the four pointers and inserting new paper scales. These paper scales can be filed away as logs. Thus graphs or records are unnecessary and the proper place to turn the dial for any given station is always in front of you. I use draughtsmen's tracing paper for my dial. The printed 0-100 scale then shows through and a graph can be drawn if desired. A blueprint can then be made of the record for permanence. Each of the four scales is colored to match the color on the band switch, another convenience.

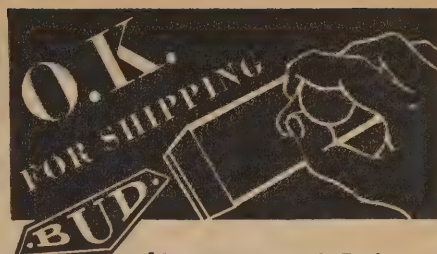
The Band-Spread Selector

I used a Cardwell Type ER 25 AD because its physical dimensions happened to fit neatly into the space formerly occupied by the RCA condenser; the latter's innards



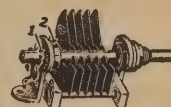
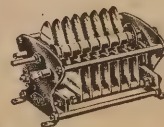
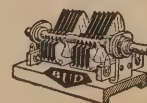
Top and bottom views of receiver.

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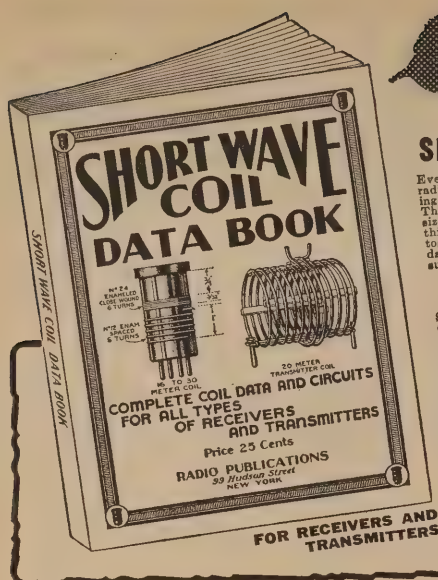
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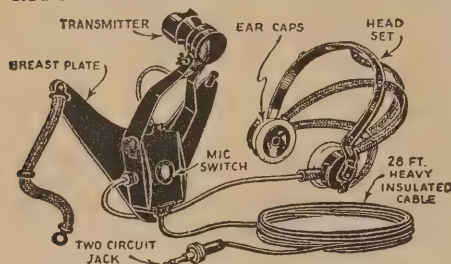
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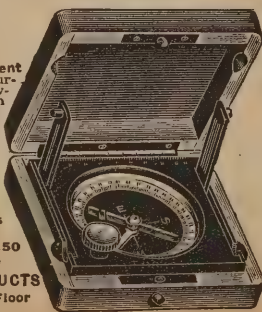
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having been scooped out. A piece of rubber tape over the RCA vernier will prevent slipping that was a characteristic of these dials as soon as they became worn.

The Chassis: Unused holes will be observed in the chassis. This is because it is easier to cut holes in the chassis before assembling and wiring than afterwards and this set is designed to permit of expansion or changing the circuit. The sheet metal man who will build this very simple chassis for you will punch these holes for little added cost. Before the chassis is formed it is simple for him to punch them out—one operation per hole. But if this is not done, then the next best bet is a fly-cutter. If you do not cut these extra holes out first and then should decide later to add to the set you will be obliged to drill a ring of small holes, punch out the center and file for smoothness—a comparatively long laborious operation.

Output: I use an output socket which connects into my wiring system so that the panel may be disconnected for service or changes simply by pulling the plug.

Power-Supply: The power-supply may be any convenient one. I use one built into another panel with a good amplifier and a switch for speaker-phones operation.

Improvements: The first improvement I would suggest would be the addition of another I.F. tube. Next, an electron-coupled separate high frequency oscillator and next a separate beat frequency oscillator and AVC to be cut in and out at will. Then I would add a tuning indicator. Another set of coils and a variable condenser added to each gang will give you band pass tuning without discarding anything.

With this panel I use another containing a frequency meter and transmitter remote control. The transmitting switch automatically cuts the B-lead when transmitting.

The Band-switch: The band switch grounds all coils not in use (except the tickler coils). Thus it was not necessary to shield and it was possible to group the coils conveniently around the switch.

Coils: The coils are wound on convenient one-inch forms purchased for junk from a salvage house. They were formerly used for broadcast inductances. I rewound them. The mounting bracket and terminals on each coil were very handy. Should you not be able to procure these coils for their forms from a salvage house, you can procure like coils new for only 15 cents each.

Coil Data

	First	Det.	Osc.	Grid	Osc.	Tickler
Antenna	L1	L2	L4			L3
160 meters	10	62	50			10
80 meters	8	27	21			10
40 meters	6	12	10			5
20 meters	4	6	5			3

Forms one inch in diameter. All coils except 40 and 20 meter coils close-wound with No. 28 enamel wire. 40 and 20 meter coils are spaced diameter of the wire and wound with No. 22 D.C.C. wire.

Regeneration winding for 6N7: 60 turns No. 28 D.S.C. wire scramble wound on 1/2 inch diameter form.

Parts List

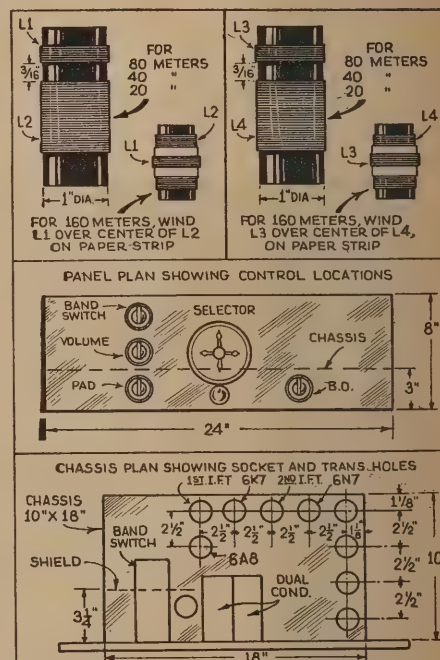
- 1 piece 3/4 inch, 5 ply, plywood 8 by 24 inches
- 1 piece 20 gauge iron 8 by 24 inches
- 1 plain chassis, 20 gauge iron 18 by 10 by 3 inches
- Shrivel paint for panel
- Old dial from Radiola Semi-Portable
- 4 bar knobs
- 4 escutcheons
- 1-4 point, 5-deck band-switch grounding coils not in use (constructed here)

HAMMARLUND

- 1—140 mmf. per-section dual midget variable condenser (Main tuning) C1, C2.
- 2—I.F. transformers kc.

BAND-SET CONDS.

- 1—Type ER 25 AD, 25 mmf. per section midget dual condenser (Band setting) C1A, C2A
- 8—one inch coil forms



Chassis layout and other details.

SOLAR

- 8—TPS F100 trimmer condensers, C3
- 3—SD 0327 .01 mf. condensers
- 3—SD 0347 .1 mf. condensers
- 1—SD 0359 .25 mf. condenser
- 2—MW 1227 .001 mf. mica condensers
- 1—MW 1239 .005 mf. mica condenser
- 1—SD 0365 .5 mf. condenser
- 1—MW 1216 mica condenser .0001 mf.

I.R.C. (Resistors)

- 6—100,000 ohm, 1 watt resistors
- 1—400 ohm, 1 watt resistor
- 2—5,000 ohm resistors, 1 watt
- 2—250,000 ohm resistors, 1 watt
- 2—25,000 ohm, 1 watt resistors
- 1—10 megohm, 1 watt resistor
- 1—40,000 ohm, 1 watt resistor
- 2—2,000 ohm potentiometers
- 2—Radio frequency chokes
- 3—octal wafer sockets
- 1—six prong output socket
- 1—coil for 6N7 regeneration, wound on S-W choke form (see coil table)
- 1—6.3 V. filament transformer
- 2—large binding posts. Ant.-Gnd.

R.C.A.

- 1—6A8 tube
- 1—6K7 tube
- 1—6N7 tube

The 6A8 tube acts as combination oscillator and detector. The coupling is electronic and accomplished inside the tube. Each oscillator grid coil is provided with a trimmer, a grid-leak (so that the grid won't be up in the air in which case it would motor-boat) and a padding condenser in series with the coil. This latter condenser attends to the tracking of the oscillator variable and the mixer variable condenser. If it were not for this padding condenser in series with each coil, which in effect is also in series with the oscillator variable condenser, the oscillator variable condenser would have to be a special small size in order to track. Or else another panel control would be necessary.

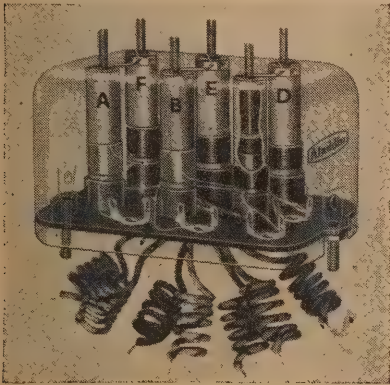
The 6K7 tube provides the single stage of intermediate frequency amplification, which is on a frequency of 465 kc. Standard I.F. transformers of a small size are used. Two tubes in one envelope and with a common cathode are provided by the 6N7. The first tube is used as a regenerative second detector. It helps the gain to work this to the critical

point and it is operated just over the spill-over point to provide the beat note needed for code reception. The second tube inside the 6N7 envelope is a resistance-coupled audio-frequency amplifier. Its output goes to a switch selecting ear-phones or connecting into one stage of push-pull amplification and a twelve-inch dynamic speaker. The tone quality is exceptionally good, but the volume is so adequate that the neighbors requested a police car to call on me and persuade me to use phones in the 'wee-sma hours! Of course, I could cut the volume down on the speaker, but it is a temptation to "turn it loose" when really inspiring music is being received.

The outfit is connected into the switching system of my station and may be used in connection with any of the separate transmitters I have for each band. It is far superior to a 3-tube T.R.F. set-up in many ways. Since the photograph was taken, the outfit has been improved by the addition of all the features that I mentioned which could be added without discarding any parts.

New Multiple Oscillator with Iron Cores

● THERE has recently been developed a



very interesting and timely piece of apparatus, a multiple oscillator which is aligned with polyiron cores. The oscillator is all contained in a very compact housing as the picture shows, and it has aroused the keenest interest among engineers who examined it.

This unit is for use in pre-selected tuning systems and by virtue of the polyiron adjusting method, obviates the drift which is attendant upon the use of compression type trimmer condensers. The stability afforded by this method of alignment makes this composite coil invaluable in those systems where drift is a critical factor.

The following ranges are obtained with the the individual coils which cover the broadcast band.

- A coil: 1520-830 kc. D coil: 1220-670 kc.
- B coil: 1520-830 kc. E coil: 870-580 kc.
- C coil: 1250-670 kc. F coil: 770-540 kc.

This article has been prepared from data supplied by courtesy Aladdin Radio Industries, Inc. No. 674.

New Xtal Microphone

● THE photo shows a new Turner microphone. This is a high-level crystal device with an output of -55 DB. It is excellently suited to Amateur and also pick-up purposes. It is quite directional—a sound from the rear is cut down tremendously, thus do-

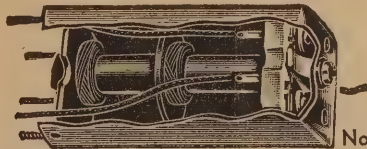


New design of Xtal microphone No. 676

ing away with feedback and facilitating duplex operation. It has a new shock absorbing interior construction which actually floats in the case, greatly reducing mechanical noises and the possibility of damage to the element due to vibration.

This article has been prepared from data supplied by courtesy of The Turner Company.

New I. F. Transf.



No. 675

● A NEW line of standard I.F. double-tuned transformers has recently been placed on the market by the Meissner Mfg. Company. They are known as the Wide-Range line. The unusual feature of these transformers is the wide range that the transformers can be tuned to. A serviceman can with only four standard wide-range transformers tune to any I.F. frequency required, from 121 to 650 kc., without skip. They are available in either air core or iron core. 1500 kc., and 3000 kc. units are also available for the amateur.

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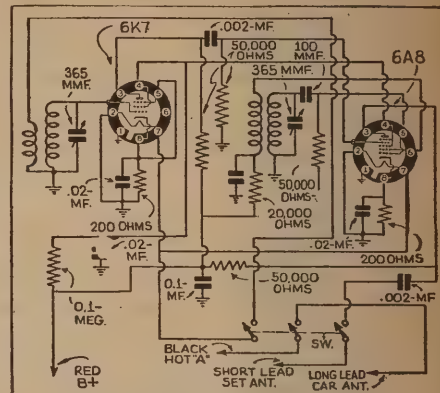
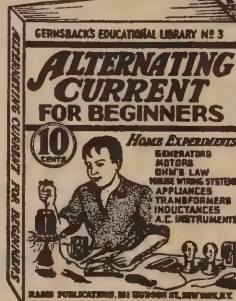
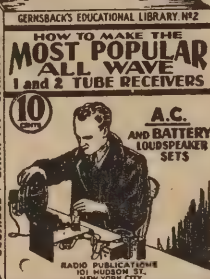
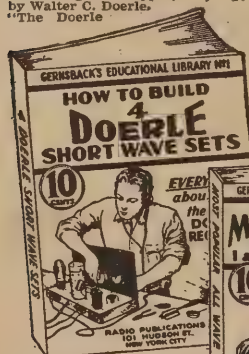
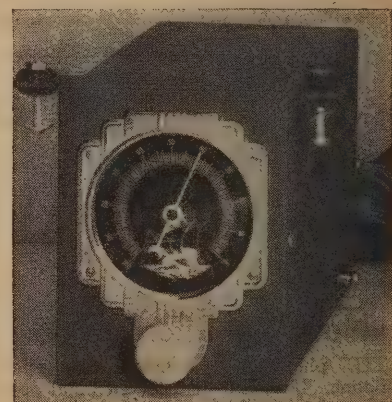


Diagram of Long-Wave Converter



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☐ No. 1—How to Build 4 Doerle Short Wave Sets.....10c
☐ No. 2—How to Make the Most Popular All-Wave 1- and 2-Tube Receivers.....10c
☐ No. 3—Alternating Current for Beginners.....10c
☐ No. 4—All About Aerials.....10c
☐ I am enclosing.....c; the price of each book is 10c
☐ Send me **FREE** circular listing 48 new 10c publications

Name
Address
City State
(U. S. Coin or U. S. Stamps acceptable.) Books are sent postpaid.

CLASSIFIED 15¢ A WORD

Under this heading only advertisements of a commercial nature are accepted. Remittance of 15c per word should accompany all orders. Copy should reach us not later than the 5th of the month for the second following month's issue.

AGENTS WANTED

SIGN LETTERS FOR STORE AND Office Windows; 500% profit. Free Samples. Metallic Co., 446 N. Clark, Chicago.

INSTRUCTION

RADIO ENGINEERING, BROADCASTING, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Colt St., Valparaiso, Ind.

COMPLETE TRAINING FOR ALL Amateur and Professional Radio Licenses. New York Wireless School, 1123 Broadway, New York.

MISCELLANEOUS

WE ORIGINALLY HAD FIVE thousand Stoppani Compasses for which the U.S. Government paid over \$30.00 each. We sold all but a very few. We cannot obtain more to sell at three times our present price. Send in your order before they are all sold at \$4.50 each, postage paid. Gold Shield Products, Room 14, Eleventh floor, 99 Hudson St., New York City.

COIL INDUCTANCE CHARTS—complete set for any size coil; accurate; \$2.15 prepaid. Slide Rules—4 inch inductance metal type \$2.00; 8" dia., 20" scale, \$5.00 prepaid. Dataprint Co., Box 322, Ramsey, N.J.

TOOL STEEL PUNCHES for round or Amphenol sockets at manufacturers' prices. Cuts clean hole with hammer blow. Round \$1.00; Amphenol \$1.50 each postpaid. Gerrett Corp., 2947 N. 30th St., Milwaukee.

PATENT ATTORNEYS

INVENTORS, ALL PATENT and trademark cases submitted given personal attention by members of the firm. Form "Evidence of Conception" and instructions free. Lancaster, Allwine & Rommel, 436 Bowen Building, Washington, D.C.

QSL—CARDS—SWL

100 NEAT SWL CARDS PRINTED with your name and address sent postpaid for \$1. Bunch of samples and RST chart for five cent stamp. WIBEI, 16 Stockbridge, Lowell, Mass.

DIRECTORY, SHORT WAVE Listener's. New Large Winter Issue. 25c. SWL-Directory, Station B, Box 116, Toledo, Ohio.

SHORT WAVE LISTENER'S, Amateur's Sensational 5 Color QSL Samples (Stamps). W-8-E-S-N, 1827 Cone, Toledo, Ohio.

QSL SWL CARDS, NEAT, Attractive, reasonably priced, samples free. Miller, Printer, Ambler, Pa.

RADIO EQUIPMENT

JOBBERS' METAL TUBE SALE—First Quality. Guaranteed 90 days: 6A8, 6C5, 6H6, 6K7, 6L6, 5Z4, 6F6, 6F7, only 55c each. All other metal or glass type 70¢ off list. Starco, 186 William Street, N.Y.C.

SHORT WAVE RECEIVERS

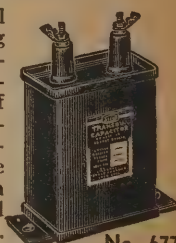
PLANS 18 DISTANCE CRYSTAL Sets—SWL record 4250 miles with "Radiobuilder" year—25c. Laboratories, 151-C Liberty, San Francisco.

WIND ELECTRIC PLANTS

BUILD WIND LIGHT PLANT WD show you how. Complete plans and valuable catalog 10c. Wind plant parts, welders, electric fences. LeJay Mfg., 417 Lake, Minneapolis, Minn.

New Oil-filled Condensers for Transmitters

● **ONE** of the Transoil oil-filled transmitting condensers recently developed by Solar, is here illustrated. This line of condensers has been especially designed for transmitting purposes; these condensers are available in a variety of capacities and for various voltage ranges. A catalog listing these items is available on request.



No. 677

This article has been prepared from data supplied by the courtesy of the Solar Mfg. Corp.

Did You Notice

The improved style of type used in this issue of **SHORT WAVE & TELEVISION**? How do you like it?

Please mention **SHORT WAVE & TELEVISION** when writing advertisers

Where to Reach Your Nearest Radio Inspector

UNITED STATES RADIO DISTRICTS

District	Territory	Address, Radio Inspector-in-Charge
No. 1	The States of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.	Customhouse, Boston, Mass.
No. 2	The counties of Albany, Bronx, Columbia, Delaware, Dutchess, Greene, Kings, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Schenectady, Suffolk, Sullivan, Ulster and Westchester of the State of New York; and the counties of Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Passaic, Somerset, Sussex, Union and Warren of the State of New Jersey.	Federal Building, 641 Washington St., New York, N. Y.
No. 3	The counties of Adams, Berks, Bucks, Carbon, Chester, Cumberland, Dauphin, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Perry, Philadelphia, Schuylkill and York of the State of Pennsylvania; and the counties of Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Ocean and Salem of the State of New Jersey; and the county of Newcastle of the State of Delaware.	Room 1200, U. S. Customhouse, Second and Chestnut Sts., Philadelphia, Pa.
No. 4	The State of Maryland; the District of Columbia; the counties of Arlington, Clark, Fairfax, Fauquier, Frederick, Loudoun, Page, Prince William, Rappahannock, Shenandoah and Warren of the State of Virginia; and the counties of Kent and Sussex of the State of Delaware.	Fort McHenry, Baltimore, Md.
No. 5	The State of Virginia except that part lying in District 4, and the State of North Carolina except that part lying in District 6.	402 New Post Office Bldg., Norfolk, Va.
No. 6	The States of Alabama, Georgia, South Carolina, and Tennessee; and the counties of Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Cleveland, Graham, Haywood, Henderson, Jackson, McDowell, Macon, Madison, Mitchell, Polk, Rutherford, Swain, Transylvania, Watauga and Yancey of the State of North Carolina.	411 New Post Office Bldg., Atlanta, Ga.
No. 7	The State of Florida, Puerto Rico, and the Virgin Islands.	P. O. Box 150, Miami, Fla.
No. 8	The States of Arkansas, Louisiana and Mississippi; and the city of Texarkana in the State of Texas.	Customhouse, New Orleans, La.
No. 9	The counties of Arkansas, Brazoria, Brooks, Calhoun, Cameron, Chambers, Fort Bend, Galveston, Goliad, Harris, Hidalgo, Jackson, Jefferson, Jim Wells, Kenedy, Kleberg, Matagorda, Nueces, Refugio, San Patricio, Victoria, Wharton and Willacy of the State of Texas.	209 Prudential Building, Galveston, Tex.
No. 10	The State of Texas except that part lying in District 9 and in the city of Texarkana; and the States of Oklahoma and New Mexico.	464 Federal Building, Dallas, Tex.
No. 11	The State of Arizona; the county of Clarke in the State of Nevada; and the counties of Imperial, Inyo, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura of the State of California.	1105 Rives-Strong Building, Los Angeles, Calif.
No. 12	The State of California except that part lying in District 11; the State of Nevada except the county of Clarke; the Hawaiian Islands, Guam and American Samoa.	Customhouse, San Francisco, Cal.
No. 13	The State of Oregon; and the State of Idaho except that part lying in District 14.	207 New U. S. Courthouse Bldg., Portland, Ore.
No. 14	The territory of Alaska; the State of Washington; the counties of Benewah, Bonner, Boundary, Clearwater, Idaho, Kootenai, Latah, Lewis, Nez Perce and Shoshone of the State of Idaho; the counties of Beaverhead, Broadwater, Cascade, Deerlodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Lake, Lewis & Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Pondera, Powell, Ravalli, Sanders, Silver Bow, Teton and Toole of the State of Montana.	808 Federal Office Building, Seattle, Wash.
No. 15	The States of Colorado, Utah, and Wyoming; and the State of Montana except that part lying in District 14.	538 Customhouse, Denver, Colo.
No. 16	The States of North Dakota, South Dakota and Minnesota; the counties of Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon and Schoolcraft of the State of Michigan; and the State of Wisconsin except that part lying in District 18.	927 New P. O. Bldg., St. Paul, Minn.
No. 17	The States of Nebraska, Kansas and Missouri; and the State of Iowa except that part lying in District 18.	410 Federal Building, Kansas City, Mo.
No. 18	The States of Indiana and Illinois; the counties of Allamakee, Buchanan, Cedar, Clayton, Clinton, Delaware, Des Moines, Dubuque, Fayette, Henry, Jackson, Johnson, Jones, Lee, Louisa, Muscatine, Scott, Washington and Winneshiek of the State of Iowa; the counties of Columbia, Crawford, Dane, Dodge, Grant, Green, Iowa, Jefferson, Kenosha, Lafayette, Milwaukee, Ozaukee, Racine, Richland, Rock, Sauk, Walworth, Washington and Waukesha of the State of Wisconsin.	2022 Engineering Building, Chicago, Ill.
No. 19	The State of Michigan except that part lying in District 16; the States of Ohio, Kentucky and West Virginia.	10th Floor, New Federal Bldg., Detroit, Mich.
No. 20	The State of New York except that part lying in District 2, and the State of Pennsylvania except that part lying in District 3.	514 Federal Building, Buffalo, N. Y.
No. 21	The Territory of Hawaii.	Aloha Tower, Honolulu, T. H.

Please mention SHORT WAVE & TELEVISION when writing advertisers

TRIPLET Pocket-Volt-Ohm- Milliammeter D.C. and A.C.

Uses large 3" Sq. Triplett Instrument. Has molded case, selector switch and all necessary accessories. A complete instrument for all servicing needs. Can be used for all A.C.-D.C. voltage, current and resistance analyses.

See Your Jobber
Write for Catalog



Size—
3-1/16"
x 5 7/8"
x 2 1/8"
Model 666
DEALER
PRICE
\$15.00

The Triplett Electrical Instrument Co.
281 Harmon Drive, Bluffton, Ohio

Please send me more information on Model 666.....

Name

Address

City..... State.....

PYRO PANTAGRAPH



Size of Box:
12 1/2 x 8 1/2
inches

\$2.75

Shipping weight, 3 lbs.

VOGUE

THIS electrical outfit is especially designed for burning designs permanently on materials such as Leather, Wood, Cork, Bakelite, etc. Plug the Pyro-electric pencil in any 110 volt AC or DC outlet and it is ready to be used. Plug and cord furnished.

By the use of the Pantagraph included in the outfit, any design may be reproduced either in original, reduced or enlarged form.

Outfit consists of: one Pyro-electric Pencil; one Pantagraph; three hardwood plaques; one bottle of Varnish; one Brush; one tracing tip and four-page instruction sheet.

Size of box: 12 1/2 x 8 1/2 inches.

Outfit will be forwarded by Express Collect if not sufficient postage included with your order.

WELLWORTH TRADING CO.

558 W. Washington Blvd., Dept SWT-138 Chicago, Ill.

All about the SHORT WAVE LEAGUE

A FEW WORDS AS TO THE PURPOSE OF THE LEAGUE

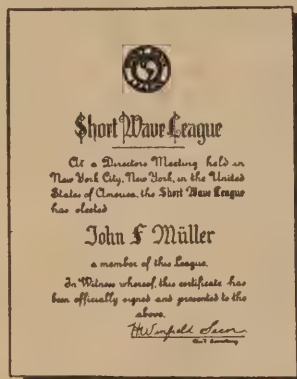
The SHORT WAVE LEAGUE was founded in 1930. Honorary Directors are as follows: Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.

The SHORT WAVE LEAGUE is a scientific membership organization for the promotion of the short wave art. There are no dues, no fees, no initiations, in connection with the LEAGUE. No one makes any money from it; no one derives any salary. The only income which the LEAGUE has is from its short wave essentials. A pamphlet setting forth the LEAGUE'S numerous aspirations and purposes will be sent to anyone on receipt of a 3c stamp to cover postage.

FREE MEMBERSHIP CERTIFICATE

As soon as you are enrolled as a member, a beautiful certificate with the LEAGUE'S seal will be sent to you, providing 10c in stamps or coin is sent for mailing charges.

Members are entitled to preferential discounts when buying radio merchandise from numerous firms who have agreed to allow lower prices to all SHORT WAVE LEAGUE members.



If you wish your name engraved on the Free membership certificate, as illustrated above, please send 25c to cover cost.

SHORT WAVE ESSENTIALS LISTED IN OPPOSITE COLUMN SOLD ONLY TO SHORT WAVE LEAGUE MEMBERS

They cannot be bought by anyone unless he has already enrolled as one of the members of the SHORT WAVE LEAGUE or signs the blank below (which automatically enrolls him as a member, always provided that he is a short wave experimenter, a short wave fan, radio engineer, radio student, etc.).

Inasmuch as the LEAGUE is international, it makes no difference whether you are a citizen of the United States or any other country. The LEAGUE is open to all.

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE 1-38
99-101 Hudson Street, New York, N. Y.

I, the undersigned, herewith desire to apply for membership in the SHORT WAVE LEAGUE. In joining the LEAGUE I understand that I am not assessed for membership and that there are no dues and no fees of any kind. I pledge myself to abide by all the rules and regulations of the SHORT WAVE LEAGUE, which rules you are to send to me on receipt of this application.

I consider myself belonging to the following class (put an X in correct space): Short Wave Experimenter ☐ Short Wave Fan ☐ Radio Engineer ☐ Student ☐ I own the following radio equipment:

Transmitting _____

Call Letters _____

Receiving _____

Name _____

Address _____

City and State _____

Country _____

I enclose 10c for postage and handling for my Membership Certificate.

New Cathode Ray Oscilloscope

(Continued from page 485)

the cathode ray tube to enlarge the image.

Two different sweeps, or comparisons with time, are found on the oscilloscope. The simplest is at the rate of 60 cycles per second and is obtained by applying an A.C. voltage to one set of deflector plates, usually the horizontal.

The second is called a linear sweep. This is the so-called saw-tooth sweep which rises to a maximum and drops abruptly to zero, over a wide range of frequencies per second.

This article has been prepared from data supplied by courtesy of the Thordarson Electric Co.

OSCILLOSCOPE PARTS LIST

Thordarson Foundation Unit and Accessories
1 Foundation unit T-11K16 consisting of chassis, panel, 913 shield and instruction sheet

1 Etched panel—T-11K17
1 Cover T-11K19 for Foundation Unit
1 2" Lens with retainer ring (Optional) T-11K20
Transformers and Chokes
1 T-9233 Power Transformer
1 T-7430 Choke

Controls	Number	Ohms	Type
R-1		500,000	Potentiometer
R-22		500,000	Potentiometer
R-2		1,000,000	Potentiometer
R-10		100,000	Potentiometer
R-11		100,000	Potentiometer
R-12		50,000	Potentiometer
R-13		25,000	Potentiometer
R-14		3,000,000	Potentiometer
S-1			2-pole, 2-position switch
S-2			2-pole, 3-position switch
S-3			1-pole, 5-position switch

R.C.A. (Tubes)

1 Type 913 Tube
1 Type 1-V Tube
2 Type 6J7 Tubes
1 Type 885 Tube
1 Type 6X5 Tube

I.R.C. (Resistors)	Number	Ohms	Watts
R-3		5,000	1
R-4		5,000	1
R-20		5,000	1
R-5		500,000	1
R-6		500,000	1
R-7		2,000,000	1
R-8		2,000,000	1
R-9		75,000	1
R-15		50,000	1
R-16		750,000	1
R-17		40,000	20
R-18		8,000	1
R-19		800	1
R-21		200	1
R-X		5,000	1 (R.)

Aerovox (Condensers)

Number	Mf.	Voltage	Type
C-1	.1	400	Aerovox 484
C-4	.1	400	Aerovox 484
C-5	.1	400	Aerovox 484
C-6	.1	400	Aerovox 484
C-18	.1	400	Aerovox 484
C-2	.003	200	Aerovox 284
C-3	.003	200	Aerovox 284
C-7	8	525	Electrolytic (GLSS)
C-8	8	525	Electrolytic (GLSS)
C-9	8	525	Electrolytic (GLSS)
C-10	8	250	Electrolytic (GLS250)
C-11	25	25	(PB25)
C-12	.5	400	(484)
C-13	.5	400	Maximum Tolerance — 10%
C-14	.13	400	Maximum Tolerance — 10%
C-15	.04	400	Maximum Tolerance — 10%
C-16	.007	400	Maximum Tolerance — 10%
C-17	.0014	400	Maximum Tolerance — 10%

Miscellaneous Parts

- 2 Metal tube grid caps
- 1 4-prong Socket (for 1-V tube)
- 1 5-prong Socket (for 885 tube)
- 1 Octal Sockets (for 2-6J7, 6X5, 913 tubes)
- 11 1/4" bar knobs
- 9 5-lug resistor mounting strips
- 1 2-lug resistor mounting strip
- 24 3/8" 6-32 nuts, screws, and lockwashers
- 1 A.C. line cord and plug
- 4 Pin jacks
- 4 Pin jack plugs
- 3 3/4" Grommets
- 1 1/2" Grommet

NOTE: The brands and types specified in the parts list were used in the original laboratory models. Parts of equivalent quality may be substituted except where physical limitations prohibit.

Voltage Analysis	
885 bias	3.2 volts
885 plate	29.0 volts
6J7 bias	2.0 volts
6J7 plates	120.0 volts
6J7 screen grids	51.0 volts
Total voltage after choke	420 volts
Voltage at anode of 1-V	480 volts
From "R" of R-10-R-11 to ground	90 volts
From "R" to "L" of R-10	45 volts

Accessories for Members of the SHORT WAVE LEAGUE

Every member of the SHORT WAVE LEAGUE wants to identify himself in some way. For your convenience the League directors have prepared suitable letterheads, label buttons, stickers, etc. In addition there are many short-wave accessories, such as maps, globes, etc., which the League offers only to members at special prices. Take your choice from this advertisement. THESE ESSENTIALS ARE SOLD ONLY TO LEAGUE MEMBERS.



LEAGUE LETTERHEADS

A beautiful, official letterhead has been designed for members' correspondence. The letterhead is invaluable when it becomes necessary to deal with the radio industry, mail order houses and radio manufacturers, as many houses offer members of the LEAGUE preferential discount. The letterhead is also absolutely essential when writing for verification to radio stations either here or abroad. It automatically gives you a professional standing.

A—SHORT WAVE LEAGUE letterheads. 50c per 100

A—50c per 100

WORLD GLOBE

This important essential is an ornament for every den or study. It is a globe, 6 in. in diameter, printed in fifteen colors, glazed in such a way that it can be washed. This globe helps you to intelligently log foreign stations. The base is of solid walnut, and the semi-meridian of a nickel-like metal. Entire device substantially made, and will give an attractive appearance to every station, emphasizing the long-distance work of the operator.

D—Globe of the World 89c

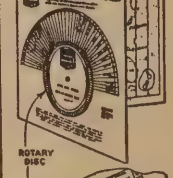
D—89c each



SHORT WAVE MAP OF THE WORLD

This beautiful map, measuring 18x26 in. and printed in 18 colors is indispensable when hung in sight or placed "under the glass" on the table or wall of the short wave enthusiast. It contains a wealth of information such as distances to all parts of the world, political nature of the country in which a broadcast station is located, etc., and from the manner in which the map is blocked off gives the time in different parts of the world at a glance.

F—SHORT WAVE Map of the World... Prepaid 25c



WORLD RADIO MAP AND STATION FINDER

The finest device of its kind published. The world's map on heavy board is divided into 23 sections, while the rotary disc shows you immediately the exact time in any foreign country. Invaluable in logging foreign stations. Also gives call letters assigned to all nations. Size 11"x22".

C—Radio Map of the World and Station Finder. 25c

LEAGUE LAPEL BUTTON



E—35c each

This beautiful button is made in hard enamel in four colors, red, white, blue and gold. It measures three quarters of an inch in diameter. By wearing this button, other members will recognize you and it will give you a professional air. Made in bronze, gold filled, not plated. Must be seen to be appreciated.

E—SHORT WAVE LEAGUE lapel button 35c

EE—SHORT WAVE LEAGUE lapel button. Like the one described above but in solid gold. Prepaid \$2.00

SHORT WAVE LEAGUE

99-101 Hudson St.,
New York, N. Y.

SHORT WAVE LEAGUE, 99-101 Hudson Street, New York, N. Y. 1-38
Gentlemen.

☐ I am a member in the SHORT WAVE LEAGUE
☐ Please send me application for membership in the SHORT WAVE LEAGUE

Please send me the following short wave essentials as listed in this advertisement:

for which I enclose \$..... herewith.

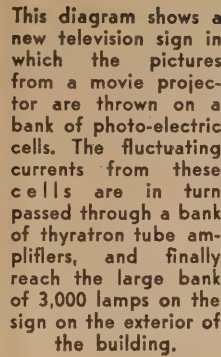
Name _____

Address _____

City and State _____

Country _____

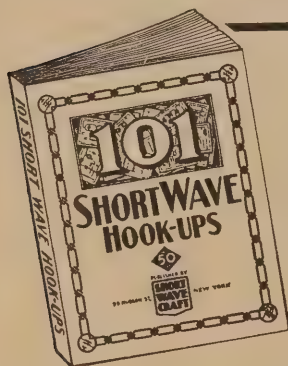
(The LEAGUE accepts money order, cash or New U. S. Stamps in any denomination. Register cash and stamps.)



Please mention **SHORT WAVE & TELEVISION** when writing advertisers

THESE OUTSTANDING SHORT WAVE BOOKS ARE Now Available AT YOUR DEALER!

YOU buy parts, tubes, kits, accessories from your local radio dealer—that's what countless thousands of short-wave fans do. Now through a nation-wide distribution service our numerous books are available at your favorite radio dealer—right where you buy other radio equipment. It's more convenient, saves time and you can inspect the books before you buy. Ask your dealer to show you all the books advertised on this page—they're always in stock.



101 SHORT WAVE HOOK-UPS

Compiled by the Editors of
SHORT WAVE and
TELEVISION

Here is a worthwhile book that every short wave listener, every short wave fan, and every short wave amateur has wanted for a long time. It gives you the 101 best short wave hook-ups which have appeared heretofore.
100 Illustrations
72 Pages

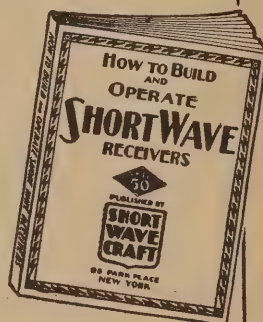
50c

HOW TO BUILD AND OPERATE SHORT WAVE RECEIVERS

This is the best and most up-to-date book on the subject. It is edited and prepared by the editors of SHORT WAVE and TELEVISION and contains a wealth of material on the building and operation, not only of typical short wave receivers, but short wave converters as well.

150 Illustrations
72 Pages

50c

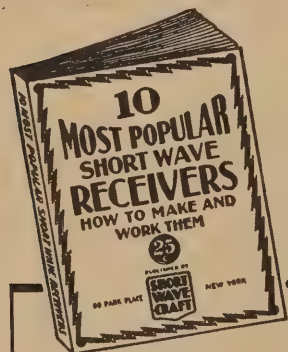


TEN MOST POPULAR SHORT WAVE RECEIVERS

HOW TO MAKE AND WORK THEM
The editors of SHORT WAVE and TELEVISION have selected ten outstanding short wave receivers and these are described in the new volume. Each receiver is fully illustrated with a complete layout, pictorial representation, photographs of the set complete, hook-up and all worthwhile specifications.

75 Illustrations
40 Pages

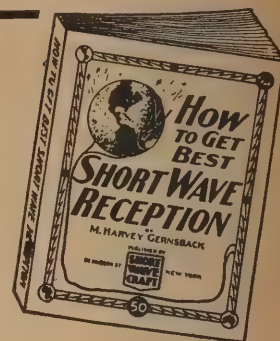
25c



HOW TO GET BEST SHORT WAVE RECEPTION

M. HARVEY GERNSBACH tells you everything you have ever wanted to know about short wave reception. The author, a professional radio listener and radio fan for many years, gives you his long experience in radio reception and all that goes with it.
40 Illustrations
72 Pages

50c



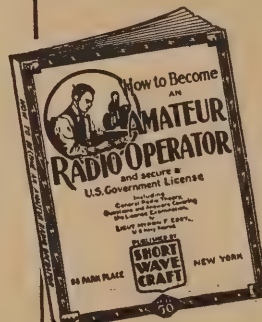
HOW TO BECOME AN AMATEUR RADIO OPERATOR

By Lieut. Myron F. Eddy, whose experience in the amateur field has made him pre-eminent in this line.

If you intend to become a licensed code operator, if you wish to take up phone work eventually—this is the book you must get.

150 Illustrations
72 Pages

50c

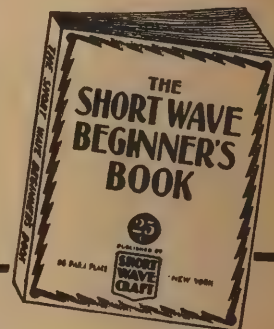


THE SHORT WAVE BEGINNER'S BOOK

Here is a book that solves your short wave problems—leading you in easy stages from the simplest fundamentals to the present stage of the art as it is known today. It is the only low-priced reference book on short waves for the beginner.

75 Illustrations
40 Pages

25c



LOOK FOR YOUR NEAREST DEALER

For convenience the publishers list below dealers in all parts of the world where our books are available. On your next shopping trip be certain to examine these volumes. You're sure to want them for your technical library.

ALABAMA
Walther Bros., Montgomery

ARIZONA
Sam's Cigar Store, Phoenix

CALIFORNIA
Electric Supply Co., Oakland
Radio Supply Company, Los Angeles
Radio Television Supply Co., Los Angeles
Pacific Radio Exchange, Inc., Los Angeles
Western Auto Supply, Los Angeles
Zack Radio Supply Co., Los Angeles
Yroman's Book Store, Pasadena
Western Radio & Elec. Co., San Diego
Ostenbach Electric Co., San Francisco
Technical Book Co., San Francisco
Zack Radio Supply Co., San Francisco
Radio Specialties Co., San Jose

COLORADO
Auto Equipment Co., Denver
Interstate Radio Supply, Denver

CONNECTICUT
The Edward P. Judd Co., New Haven

DELAWARE
Wilmington Elec. Spec. Co., Inc., Wilmington

FLORIDA
Radio Accessories Co., Orlando

GEORGIA
Wholesale Radio Service Co., Inc., Atlanta

ILLINOIS
Allied Radio Corporation, Chicago
Walter C. Braun, Inc., Chicago
Chicago Radio Apparatus Co., Chicago
A. C. McClurg & Co., Chicago
Midwest Radio Mart, Chicago
Newark Electric Co., Chicago
Sears, Roebuck & Co., Chicago
Max Stein & Co., Chicago
Montgomery Ward & Co., Chicago
Wholesale Radio Service Co., Inc., Chicago

INDIANA
Van Sickle Radio, Indianapolis

MASSACHUSETTS
DeWolfe & Fluke Co., Boston
The Personal Book Shop, Boston
Wholesale Radio Service Co., Inc., Boston
Library Book House, Springfield
Tremont Elec. Supply Co., Boston

MICHIGAN
Rissi Brothers, Detroit

MINNESOTA
St. Paul Book & Stat. Co., St. Paul

MISSOURI
Burststein-Applebee Co., Kansas City
Radio Labs., Kansas City
Walter Ashe Radio Co., St. Louis
Van Sickle Radio Co., St. Louis

NEW JERSEY
Radio Apparatus Co., Newark
United Radio Co., Newark
Wholesale Radio Service Co., Inc., Newark

NEW YORK
Fort Orange Radio Dist. Co., Albany
Wholesale Radio Service Co., Inc., Albany
Wholesale Radio Service Co., Inc., Jamaica, L. I.
American News Co., New York City
Baker & Taylor Co., New York City
Blan, the Radio Man, New York City
David Bogen & Co., New York City
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Uncontrolled Oscillations

(Continued from page 478)

What Do You Say, SWL's?

Incidentally, it might interest those SWLs who have cards printed reading, W2SWL or W9SWL, etc., to know that the use of the amateur call district on these cards is in violation of the Radio Act of 1934.

Yours for less SWL QSLs

CHARLES FIEGE, JR., N2DDV, RM1c., Mantoloking Road, Laureton, N.J.

P.S.: How's about printing this in your *Short Waves and Long Waves* department, Mr. Editor, and see how many SWLs break out their pyrex pens and asbestos paper.

(Well! Here she is—let's hear from the SWLs—Editor.)

A Boost from New Zealand!

(Continued from page 479)

I am a regular reader of your magazine and am convinced that there is not a better short-wave magazine published. The up-to-date station list and the DXers notes are a boon to us in New Zealand.

Yours sincerely,

W. D. McComb,
I Merani St., Devonport,
Auckland, New Zealand.

Built 36 "S. W. & T." Sets—All "F.B."!

Editor,

I have been a reader of your "F.B." Magazine for a long time, and I still think that you have a SWELL "Mag."

So far I have built 36 of the sets that were in your Mag. and they all worked "F.B." I have been in the radio game for the past 9½ years and I only wish I could have had "S. W. & T." when I started.

I will be only too glad to exchange cards with any one and especially foreign fellows. I will answer all letters to man, woman and child so if you will put this in your "F.B." Mag. I sure will appreciate it.

Now for a little brick-bat, I still don't see why you are putting in all that junk about Television. The SWLs are not going to pay any attention to it, and I don't think that many hams do either. If you would put more diagrams of swell sets and more data on the things that the SWLs like and less on Television, I think you will have a better Mag.

Now please don't get me wrong, I still get your Mag. and think the following sections are swell: Joe Miller's column; World S-W Station List; Short Wave Kinks and Short Waves and Long Waves.

Will you please put this in your next issue and I hope to hear from some of the "Y.L.'s." Hi!

Hoping that you keep up the good work on short waves, I am

DICKSON WITMAN,
41 Peters Place,
Red Bank, N.J.

(Well, Dickson, it seems from some of the other letters received from readers, that they want to learn as much as possible about Television. So we're trying to please everybody. Congrats on building 36 S. W. & T. sets! Glad to know they all worked OK.—Editor.)

He's Interested in Astronomy!

Editor,

I am very much interested in radio, but in addition to this I am interested in amateur astronomy. I was able to identify Finster's comet and have made a chart of the course it followed, and I also have a similar chart of the course of Peltier's comet of 1936. I am very much interested in astronomical phenomena and will be glad to hear from any

BARTER AND EXCHANGE FREE ADS

Space in this department is not sold. It is intended solely for the benefit of our readers, who wish to buy, sell or exchange radios, parts, phonographs, cameras, bicycles, sporting goods, books, magazines, etc., without profit. As we receive no money for these announcements, we cannot accept responsibility for any statements made by the readers. Use these columns freely. Only one advertisement can be

accepted from any reader in any issue. All transactions MUST be above board. Remember you are using the U. S. mail in all these transactions and therefore you are bound by the U. S. Postal Laws. Describe anything you offer accurately and without exaggeration. Treat your fellow men the way you wish to be treated. We welcome suggestions that will help to make this department interesting and profitable to both buyer and seller.

HAVE YOU STAMPS TO TRADE? Collectors in South America, British Colonies, elsewhere, please write. I have and want commemoratives, airmails, Coronations, etc. Also want quantities recent used U.S. commems. Reply assured to all. Charles Lasky, 162-13 Hillside Ave., Jamaica, New York.

WANTED: USED CANDLE course. Also duo-amplidyne receiver. Will swap \$2.89 cartooning course for—what have you? Write Warren Wilson, Glen Ullin, North Dakota.

SWAP: 500 U.S. AND FOREIGN stamps. No German. Several sets. Address mounted on notebook paper. Want: Used 913 C.R. tube or X'tal any Ham freq. Robert W. S. Bue, Rte. 1, Clinton, Wis.

FOR SALE: LABORATORY TYPE slide wire Wheatstone bridge for capacity inductance and resistance measurement. Accurate scale. Low loss bakelite insulation and heavy brass and copper bar connections. Reasonable. Robert Lepic, 3926 South St. Louis Ave., Chicago, Ill.

FOR SALE: COMPLETE BATTERY operated rig—19-33 receiver—31 T.N. T. transmitter. Including tubes, coil, speaker and 3 B batteries. All mounted in wooden cabinet—18"14"10". Weight about 30 lbs. \$8.75 plus shipping charges. Will also sell new W. E. telephone handset \$3.00 and high speed key \$1.25. All for \$11.75 plus shipping charges. Barnett Mitchell—W4E2I—Route 4, B.114, Selma, Alabama.

FOR SALE OR SWAP: ONE Radiart Corp. type P6 portable vibrator analyzer, brand new, in factory carton, won in Radio Craft Servicemen's Contest and never used. List price \$25; tests all vibrators as well as associated circuit components; will trade for good used servicing or shortwave equipment. What can you offer me? J. A. Ladue, President Hotel, Long Beach, N.Y.

'37 KNIGHT SUPER-GAINER kit, pts. slightly used, 4 metal tubes, 40-80 coils, \$10, postpaid, Marv Loftness, Devils Lake, N.D.

WANT GOOD S.W. RECEIVER as Elgin IIL R.S.R. Clipper, AC-4 or similar set. Exchange Majestic Electric Razor, Brilliant Camera—7.7 lens, boxes, 1000 postcards, used and unused. Send lists to Joseph Nagy Jr., 9610 Kennedy Ave., Cleveland, Ohio.

I WILL TRADE CANADIAN stamps for stamps of foreign countries. with any readers outside of the United States and Canada. I guarantee to answer all letters promptly. James W. Newman, 45 Sixth St., New Toronto, Ontario, Canada.

WANTED—GOOD PRESELECTOR also crystal mike and PB7XA complete. N. R. Thornton, Somerville, Ohio.

I HAVE FOR SALE A "MEISSNER 8" tube metal set in kit form all accessories, condensers, resistors, everything to complete it and will sell it for \$20.00, costs \$40.00, except the horn which I need for another set. Please send money order. Harlan Fulmer, 327-N. 69th St., Wauwatosa, Wis.

SWAP LINOTYPE KEYBOARD and course, miniature candid cameras, etc. Want 220 pistol or 8m projector. Roscoe Hukill, 1484 W. Broad St., Columbus, Ohio.

WILL SELL SW RECEIVER USING 58, 57, 56, 2A5, high quality parts (U.T.C., Aerovox, Centralab, National). Built on a 10"x12" chassis with Isolantite sockets, black crackle panel, stand-by switch, phone jack, and with 8 general coverage and 8 band coverage coils. Sell for not less than \$25. (coils alone worth \$6.) photo on request. G. Black, 12 Lambert Rd., Belmont, Mass.

WILL SWAP: 6E5 TUNING UNIT or bridge, neon tube condenser tester, all types of tubes (receiving), and telephone receivers. For what have you or phonograph pick-up (electric) and motor. Charles Mourmouris, 2121 South Washington Street, Denver, Colorado, U.S.A.

WILL SELL PRACTICALLY NEW Hallcrafters 8K Buddy super complete with tubes \$20.00. Will trade 65 copies QST magazine 1924-1931 for what have you. WYTMQ, 3860 Harrison Street or phone SACramento 0828, Chicago, Ill.

WILL SELL OR TRADE SHORT wave equipment, reasonable terms. Call, or write for details. Also wish to correspond with other fellows and exchange experiences. John J. Vilkas, 1515 So. 49th Court, Cicero, Illinois.

I WOULD LIKE TO SELL AN Eilen model 7C receiver 5 tubes with broadcast coils \$11.00. A. E. Rodesky, Box 346, Suffern, N.Y.

I HAVE (15,000) FIFTEEN THOU- sand varieties of foreign and domestic stamps, many rare mint copies without hinge marks. I want any two or three tube battery or electric receivers for short wave reception. I have several King George Jubilee Sets mint copy. Albert Hartman, 419-91st Street, Brooklyn, N. Y.

SHORT WAVE LISTENERS IN foreign countries. Let's swap SWL cards. Just send me one of yours and I'll send you one of mine in the next mail. C'mon fellas QRA Chris Davis Jaffe', Algonquin Park, Norfolk, Virginia, U.S.A.

TRADE—MEISSNER DUAL ALI- Wave Trap, new; magnetic speaker in cabinet, new; M.R.L. No. 2 crystal radio set, long distance reception on crystal, new, selective; old foreign coins, magical apparatus, books, manuscripts, like new; fishing tackle, new and used. Wanted—Patterson No. 10 Preselector, Shuart Antenna Tuner. Also will trade Scott 12 tube All-Wave receiver, 6 wave bands, and pay cash difference for later model Scott or McMurdo-Silver receiver. Don M. Newbold, 213 Locust St., Akron, Ohio.

WILL SWAP 204A WITH FILA- ment transformer for SW3 or what have you? Wesley R. Bard, W7GDY, Box 1014, Laurel, Mont.

WILL TRADE FOR TRANSMIT- ting equipment electric phone-turntable, heavy duty motor, Webster magnetic wave bands, and RCA double button mike. Wilbur Slater, W8RBK, B. No. 212, Clarion, Pa.

FOR SALE—SLIDE-FOCUSING, 70-350 power budget microscope with accessories, almost new, 100 mmf. variable condensers, type 30 tubes, audio transformers, other parts. Will sell very cheap. Edward Wooten, Varita Court, Apt. F, Wilson, N.C.

BEST CASH OFFER TAKES COM- plete 5 meter receiver, 5 tubes, separate power supply, dynamic speaker, all well shielded. George Swanson, Box 224, Englewood, N. J.

FOR SALE OR TRADE: 1-3 TUBE receiver, all wave, battery set. Webster phonograph pickup, electric turntable, 5 pair of ice skates. Would like to have automatic record changer. Make an offer. Bill Godden, Emmetsburg, Iowa.

FOR SALE—SCOTT XV. \$125 console \$10; factory seals intact; guarantee two years to run. H. A. C. S.W. 500 stations. G. C. Gallagher, 18 Delano Avenue, San Francisco, California.

FOR SALE—TRF SET. 13-200M. 5 tubes, airplane dial, separate pre-selector, 2 sets Hammarlund coils, 5 in. speaker, power-supply with built-in voltmeter. Set in varnished wood cabinet. Complete with tubes \$18.00. Howard Deans, 226 Cherry St., Sharon Hill, Pa.

1000 VOLT POWER SUPPLY \$15 complete. John Henninger, 2012 N. Howard St., Philadelphia, Pa.

FOREIGN POSTCARD COLLECT- ors: Will exchange picture postcard, your locale for mine. Please autograph picture side of card before sending. Harold S. Klein, 1821 Santa Ynez Street, Los Angeles, California, U.S.A.

SWAP: ¼ H.P. MOTOR AND Craftsman bench saw. Will cut up to 14" stock. I want good amateur superhet receiver. W3CD, 133 Linden Ave., Collingswood, New Jersey.

SELL OR TRADE 16mm MOVIE projector, same as new. Make me an offer. Max Welton, 31 E. 24th St., Holland, Mich.

SELL COMPLETE RSR CLIP- per communication receiver, like new, \$22.50. William Hail Jr., 708 N. Bever St., Wooster, Ohio.

SELL OR SWAP 6 PAIR SHORT wave coils (12 coils) from a National SW45. Good condition. J. De Sousa, Jr., Box 180, Medway, Mass.

CLEANING UP—YOUR CHANCE—new Cannonball headset 5000 ohms, \$2.00 postpaid—used 2000 ohm headset 55c postpaid—1 new Utah magnetic loud speaker unit, 40c postpaid—1 dual magnet speaker in cabinet, 12x12x7, in excellent condition, \$3.00 postpaid—1 RCA Radiola, 7 tube electric, Al condition, table model \$10.00 prepaid, 1-5 tube Erla battery radio, complete with 230 tubes, \$3.00, table model, not prepaid, 1 small 3 tube battery radio \$1.25 prepaid. Assortment of radio parts (value about \$10.00) 50c postpaid, 1 small magnetic speaker in cabinet 65c postpaid, 1 Corona portable typewriter, in Al condition, slightly dusty, new ribbon, prepaid \$10.00, 1 Springfield single shot 22 cal. rifle, excellent condition, \$2.50 prepaid. All above guaranteed to be worth more than the price asked for same. Will swap any of the above for small gasoline motor, suitable to build a motor scooter. Address Paul H. Hammel, 308 N. First St., Leighton, Penna.

WILL SWAP OR EXCHANGE: One Detrola short wave converter including three tubes. This converter is slightly used. Have received foreign stations and hams with it. It is in first class condition. Will swap or trade for Preselcter, what you? Write: Charles Stephens, 1 North Street, Randolph, Mass.

WILL TRADE 38 CAL. 5-SHOT revolver in A-1 condition for A.C. receiver all wave; 5 meter equipment, small phone xmitters or xtal mike. Walter Juranic, RFD No. 2, Red Hook, N.Y.

WILL EXCHANGE A GRUNOW 6 tube all-wave superheterodyne receiver, 4 bands, 13 to 550 meters, no plug-in coils, DX verifications all continents, for a typewriter in good condition. Herman Fischer, 181 Park Place, Brooklyn, N.Y.

I HAVE 2,000 AMERICAN AND foreign postage stamps mounted in good album. Also many duplicates. Will swap for fairly good preselector or what have you. Write Vincent Salerno, 2009 Woodlyne, Ave., Camden, N.J.

FOR SALE 1937 HALICRAFTERS Sky Chief, like new, in A-1 condition, \$30. William F. Smith, 11 Stewart St., Bx 273, Dolgeville, New York

WILL SWAP A 600 POWER triple objective Brownscope "Professional" Microscope, and a "Baby Cyclone" midget gasoline Airplane motor, for what have you?; the above are in A-1 condition. Wm. Bugalski, 2635 E. Ferry, Detroit, Mich.

I WOULD LIKE TO BUY USED two 110-115 Volt A.C. Turntables and two Astatic Crystal Pickups, also an Astatic Crystal Microphone Alford B. Shenton, Box 248, East Liverpool, Ohio.

SELL—1937 PEAK PRE-SELEC- tor, Wright DeCoster 100 P.M. speaker, Utah Transformer, 380 Volts C.T. 150 mls., all in excellent condition, or will swap any or all of the above for good volt-ohm-millammeter or what have you in the line of receiving equipment. Fred Campbell, 3346 Boulevard, Jersey City, N. J.

I HAVE A USED RTT COURSE which I would like to trade for a mimeograph. There are some lessons missing from the course, but all the tests and correct answers are intact. J. S. Jackson, Jr., 1306 Adam Street, Bowling Green, Ky.

THIS MAGAZINE AND OTHER magazine subscriptions given in exchange for stamps from your everyday mails. Foreign contacts especially desired. Radio WTGEQ, Gold Beach, Oregon, U.S.A.

WANTED, RIDERS MANUALS. No. 1-2-3-4-5-6. State Cash Price and Condition, in reply. Modern Electric, Middle Valley, N. J.

I HAVE A FULLY EQUIPPED bicycle in good condition which I will trade for a receiver, transmitter, testing equipment or other radio parts. Write and make offer and ask for details. Bob Yeager, 30 N. Third St., Madison, Wis.

HAVE A COMPLETE DOCTORS Diagnostic set including Ophthalmoscope, Auscultoscope with 3 Specula and additional supplies for set, English manufacturer never used. American battery, will trade for up-to-date Ham commercial equipment. L. Reiss, 1230 Park Ave., New York City.

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Short Wave Leaguers who are interested in this branch of science and would like to hear more news about astronomy over the radio. So, "hams," if you are interested in this other equally fascinating science, you can do us a very great service by keeping us informed on new comets, sun-spots, eclipses, etc.—EDWARD L. SMILEY, 221 S. Main St., Abbeville, La.

(Our congratulations, Edward on your interest in astronomy, and we are quite sure that you will hear from many other short-wave fans and hams who are likewise interested in this branch of science. There are many important astronomical aspects to short-wave problems, which students like yourself can help to clarify during the next decade.—Editor)

THE "PROF. DOERLE" A GREAT SET!

Editor,

I have just built the Prof. Doerle receiver from diagram given in the Question Box of the March '37 issue, and it sure is a great set.

In five days I have received short-wave broadcasts from England, Germany, Cuba and South America, as well as the U. S. I have heard "ham" stations in Pennsylvania, New Jersey, Ohio, Michigan, Iowa, Missouri, Minnesota, Kansas, Alabama, Mississippi, North Carolina, Texas, Georgia, Oklahoma, Florida, California, and South Dakota—also portables in Louisiana and Colorado.—CHARLES DIXON, 621 Henry St., Belle Vernon, Pa.

A BOOST FROM ENGLAND

Editor,

Just a few lines from an English reader expressing my admiration for *Short Wave & Television*. There is no other "mag," like it in England, and although I do not get it until 3 months after publication, it is always very up-to-date.

I am also interested in transmitting and would be pleased to correspond with anyone, anywhere, on S-W reception and transmission (and television, if of interest to anybody!).—ANTHONY GEORGE HOBSON, 99 Woodhouse Road, Doncaster, Yorkshire, England.

How to Get Crystal Control on 5 Meters

(Continued from page 518)

pull amplifier. The modulator is a 6L6 driven by a 6C5.

Figure E shows the RF section of a 60 watt transmitter using a 6J5G as the crystal oscillator. The oscillator drives a 6L6 as a doubler to 5-meters and this in turn drives the 35T in the final. The 6L6 tube is easily over-driven and for this reason, considerable care should be exercised in adjusting the coupling between it and the oscillator tank.

The constructional details and circuit diagram of a complete single tube 5-meter crystal control transmitter are shown in Figures F and C. It consists of a single 6E6 as a crystal oscillator and doubler modulated by a 6F6. This transmitter is simplicity itself, both in performance as well as in construction, and due to the fact that crystal control is used, results equivalent to a 10 to 12 watt self-excited rig are obtained. The performance of this transmitter is a good example of what can really be done with crystal control on 5-meters.

Not only does the 10-meter crystal make possible portable 5-meter crystal controlled transmitters, but it also greatly simplifies the construction of high power transmitters. When these facts are considered, together with the concentration of power on a single frequency, the desirability of crystal control is obvious—and the practical answer is the use of the HF2 10-meter crystal unit.

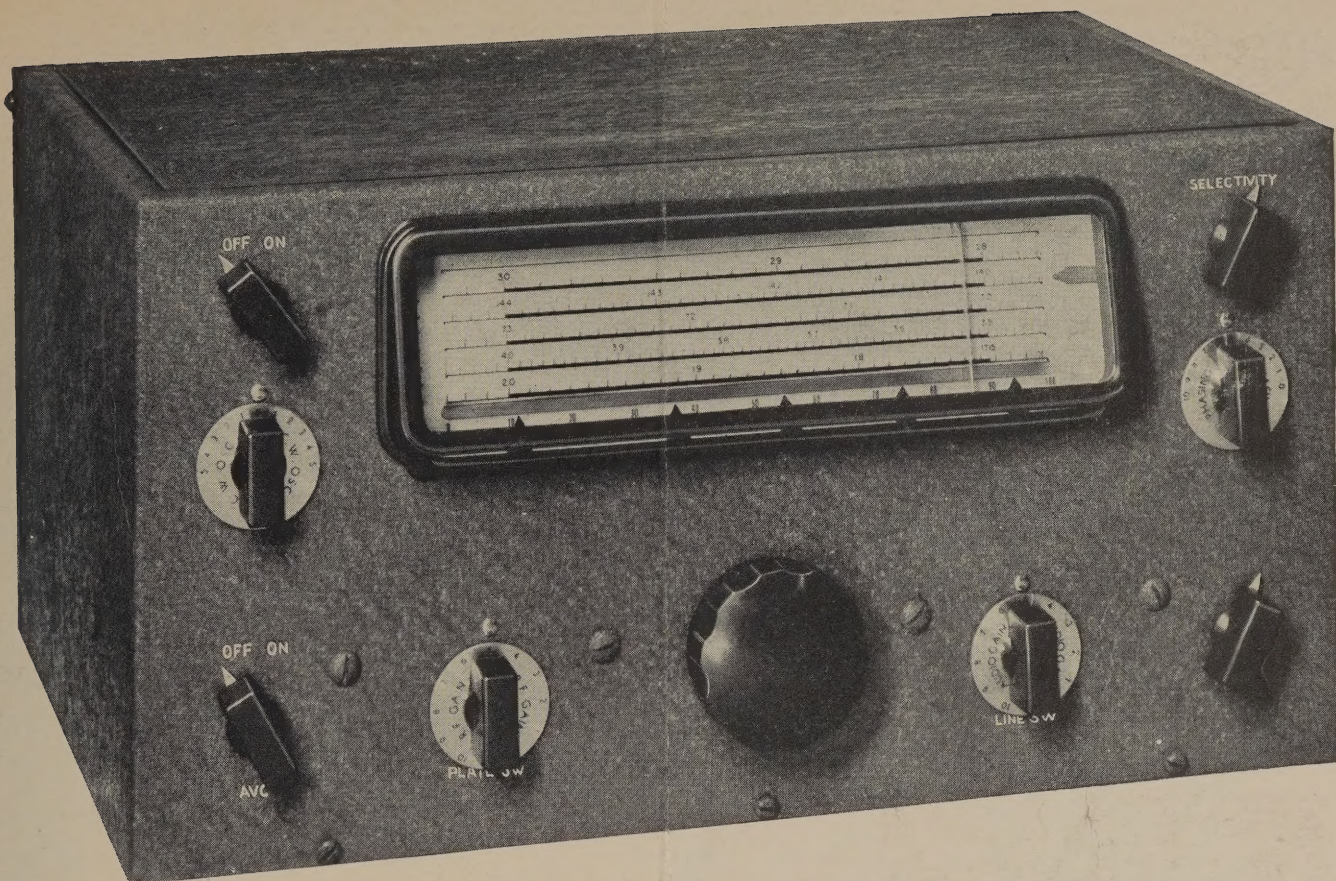
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The NATIONAL NC-80X

See the new National NC-80X at your dealers. It embodies basic new improvements that for the first time make it possible to design a high-performance communication receiver at a low price. A new crystal filter circuit provides continuously variable selectivity from 400 cycles to 5 kilocycles, and wide phasing range. By its use, noise and interfering signals are reduced enormously. A high IF frequency (1560 KC) separates image frequencies by so great a span that they are readily rejected. These features make it practical to eliminate preselector stages. Use of new tubes designed for very low plate voltages allow AC-DC operation without sacrifice in performance. Thanks to such refinements, it has been found possible to engineer this new receiver with the high quality of the NC-100X, including the famous Movable Coil Tuning Unit, and yet achieve the remarkably low price of \$88.00 Net, complete with speaker, tubes, and power supply. Two models are available, the NC-80X with coverage from 550 KC to 30 MC, and the NC-81X Amateur Model (illustrated) covering five amateur bands with extreme bandspread. The new National Catalogue No. 270 describes this fine receiver in detail.



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